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NOTES ON AMERICAN WILLOWS. XII

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a. SYSTEMATIC ENUMERATION OF THE SECTIONS, SPECIES, VARIETIES AND FORMS OF AMERICAN WILLOWS

IN a note "Ueber die systematische Gliederung der Gattung Salix" in Oest. Bot. Zeitschr. (1915) 273, I pointed out how difficult it is to elaborate a systematic arrangement of this genus representing the true relationship of the different sections. I do not agree with the arrangement made by Andersson (1867 and 1868) nor with the new grouping proposed by Von Seemen (1903) for reasons given in my note referred to above; and having studied, too, the Willows of Eastern Asia (see in Sargent, Pl. Wilson, III. 40–179 [1916]) I am convinced that some of the characters upon which Andersson and Von Seemen based their arrangements cannot be regarded as of great taxonomic value.

The real relationship between the different sections enumerated below cannot be shown clearly in a linear sequence. The first four sections include the species with more than three stamens and may be considered as forming a rather natural group known as Pleiandrae or Pleonandrae, but the sect. Nigrae does not seem to be too closely related to the others. Sections V to XXIII comprise the Willows with two stamens or with only one as it is the case with the last section Sitchenses. The occurrence of only one stamen in most of the flowers is also to be observed in *Salix Uva-ursi* which has now been placed by me in Sect. Herbaceae.

Besides the number of three or more stamens the first four groups have in the pale deciduous flower-bracts of both the male and female flowers another peculiar character in common. The same kind of bracts are found in Sect. V. Longifoliae, a group of otherwise very different species which occupies an isolated position among the American Willows.

Sect. VI to XXIII are arranged as far as possible according to the impression I got of their relationship by comparing all their taxonomic characters, I am not yet in a position to propose a good key clearly showing how to distinguish all those sections. As I have already explained in note VIII (Jour. Arnold Arb. I. 229), I thought it best not to unite species of apparently no close affinity in the same group but to propose

new sections for those species which show good characters. I can only repeat what I said in the introduction to note IX (l. c. II. 1), that I desire to induce as many students as possible to take a keen interest in the study of American Willows, and to point out the defects of our present knowledge in regard to them.

In the following enumeration I shall add a few corrections and new observations. I shall also include the full synonymy of all these species and forms dealt with by me in the Botanical Gazette, without repeating here the exact quotations indicating only the place where they are found.[1]

Sect. I. NIGRAE Loudon.—See Schneider in Bot. Gaz. LXV. 5 and in this Jour. I. 5.

1. **S. Humboldtiana** Willdenow.—*S. magellanica* Poiret.—*S. falcata* Kunth.—*S. Humboldtiana*,** *S. falcata* Andersson.—*S. Humboldtiana falcata* Andersson.—*S. chilensis* Morong & Britton, not Molina.—See Schneider in Bot. Gaz. LXV. 6, and in this Jour. I. 5.

1a. **S. Humboldtiana** f. **fastigiata** André in Rev. Hort. LXVIII. 177, f. 58–60 (1896).

1b. **S. Humboldtiana** var. **stipulacea** Schneider.—*S. Houstoniana* Pursh, pro parte.—*S. stipulacea* Martens & Galeotti.—*S. oxyphylla* Kunth.—*S. Humboldtiana* ***S. oxyphylla* Andersson, pro parte.—*S. Humboldtiana* γ *oxyphylla* Andersson, pro parte.—*S. Humboldtiana* Martens & Galeotti.—See Schneider in Bot. Gaz. LXV. 7, and in this Jour. I. 5.

1c. **S. Humboldtiana** var. **Martiana** Andersson.—*S. Martiana* Leybold.—*S. Humboldtiana* * *S. Martiana* Andersson.—See Schneider in Bot. Gaz. LXV. 8, and in this Jour. I. 5.

2. S. **nigra** Marshall.—See Schneider in this Jour. I. 5.—To the synonyms may be added with ? *S. dubia* Trautvetter in Mém. Sav. Étr. Acad. St.-Pétersb. III. 626 (Salict.) (1837). This is nothing but a new name for *S. ambigua* Pursh on account of the older name *S. ambigua* of Ehrhart. Pursh's name had already been changed by Sprengel.

2b. **S. nigra** var. **altissima** Sargent.—See Schneider in this Jour. I.

2c. **S. nigra** var. **Lindheimerii** Schneider.—*S. Humboldtiana* γ *oxyphylla* Andersson, pro parte.—*S. nigra* Mackensen.—*S. Wrightii* Sargent, pro parte.—*S. Humboldtiana* Blankinship.—See Schneider in Bot. Gaz. LXV. 9 and in this Jour. I. 8.

3. **S. Gooddingii** Ball.—*S. nigra* Bebb, pro parte.—*S. nigra* var. *vallicola* Dudley.—*S. vallicola* Britton.—*S. Wrightii* Wooton & Standley, pro parte.—See Schneider in Bot. Gaz. LXV. 12, and in this Jour. I. 9.—Ball in Bot. Gaz. LXXII, 227, fig. 2–4 (1921).

Sect. II. TRIANDRAE Dumortier.—Sect. *Amygdalinae* Koch, pro parte. —See Schneider in Bot. Gaz. LXV 13, and in this Jour. I. 9.

[1] After we had received from Mr. Schneider part XII of his Notes on American Willows two papers on American Willows by Mr. Ball have appeared in The Botanical Gazette; the new names published there have been inserted in this enumeration to make it as far as possible a complete account of all American Willows known to the end of 1921.—ED.

4. **S. amygdaloides** Andersson.—See Schneider in this Jour. I. 9.—Ball in Bot. Gaz. LXXII. 236 (1921).

4a. **S. amygdaloides** f. **pilosiuscula** Schneider in this Jour. I. 11.

4b. **S. amygdaloides** var. **Wrightii** Schneider.—*S. Wrightii* Andersson.—*S. nigra* *** *S. Wrightii* Andersson.—*S. nigra β latifolia γ brevifolia testacea* Andersson.—*S. testacea* Andersson.—See Schneider in Bot. Gaz. LXV. 14, and in this Jour. I. 12.

Sect. III. PENTANDRAE Dumortier, subsect. LUCIDAE Schneider.—See Schneider in this Jour. I. 13.

5. **S. serissima** Fernald.—See Schneider, in this Jour. I. 13.—Ball in Bot. Gaz. LXXII. 220 (1921).

6. **S. lasiandra** Bentham.—See Schneider in this Jour. I. 15.—Ball in Bot. Gaz. LXXII. 222 (1921).[1]—*S. Hoffmanniana* Hooker & Arnott, Bot. Beechey's Voy. 159 (1833), non Smith.

6b. **S. lasiandra** var. **lancifolia** Bebb.—? *S. (pentandra) lucida angustifolia pilosa* Andersson.—*S. lancifolia* Andersson.—See Schneider in this Jour. I. 17.

6c. **S. lasiandra** var. **caudata** Sudworth.—See Schneider in this Jour. I. 19.[2]

7. **S. lucida** Muhlenberg.—See Schneider in this Jour. I. 20.—Ball in Bot. Gaz. LXXII. 220 (1921).

7a. **S. lucida** f. **angustifolia** Fernald.—See Schneider in this Jour. I. 22.

7b. **S. lucida** var. **intonsa** Fernald.—See Schneider in this Jour. I. 22.

Sect. IV. BONPLANDIANAE Schneider.—Sect. *Amygdalinae* Andersson, pro parte.—See Schneider in Bot. Gaz. LXV. 15 and in this Jour. I. 22.

8. **S. jaliscana** Jones.—See Schneider in Bot. Gaz. LXV. 16 and in this Jour. I. 22

9. **S. Bonplandiana** Kunth.—See Schneider in Bot. Gaz. LXV. 17, and in this Jour. I. 23.

9a. **S. Bonplandiana** forma incerta.—*S. Humboldtiana falcata* J. D. Smith.—See Schneider in Bot. Gaz. LXV. 19.

9b. **S. Bonplandiana** var. **pallida** Andersson.—*S. pallida* Kunth.—*S. Bonplandiana* * *S. pallida* Andersson.—See Schneider in Bot. Gaz. LXV 19 and in this Jour. I. 23.

9c. **S. Bonplandiana** var. **Toumeyi** Schneider.—*S. Bonplandiana* Bebb, pro parte.—*S. Toumeyi* Britton.—See Schneider in Bot. Gaz. LXV. 20, and in this Jour. I. 23.

10. **S. laevigata** Bebb.—See Schneider in this Jour. I. 23.

10a. **S. laevigata** f. **araquipa** Jepson.—See Schneider in this Jour. i.

[1] **S. lasiandra** var. **Abramsii** Ball in Bot. Gaz. LXXII. 224 (1921).—"It differs from the species chiefly in the smaller and narrower, less serrulate leaves and the nearly eglandular pedicels. It seems to be limited in its distribution to the Sierra Nevada of central eastern California, from Plumas County, south to Fresno County."—ED.

[2] **S. caudata** var. **parvifolia** Ball in Bot. Gaz. LXXII. 225, fig. 1 (1921).—"In the northern part of the range of *S. caudata* is found a form of lower stature and with shorter narrower leaves (fig. 1). It occurs rather commonly and appears to be the dominant form in the mountains of northwestern Montana and southern Alberta." Specimens are enumerated from Alberta, Montana, Wyoming, Idaho, Oregon, Utah.—ED.

24.—*S. laevigata* var. *araquipa* Ball in Bot. Gaz. LXXII. 234 (1921).

11. **S. longipes** Shuttleworth.—*S. occidentalis* Bosc.—*S. subvillosa* Elliott.—*S. longipes* var. *pubescens* Andersson.—*S. gongylocarpa* Shuttleworth.—*S. floridana* Chapman.—*S. Humboldtiana* Grisebach.—*S. nigra* ****S. longipes gongylocarpa* Andersson.—*S. nigra* γ *longipes* 2 *gongylocarpa* Andersson.—*S. Bonplandiana* Sauvalle.—*S. occidentalis* var. *longipes* Bebb.—*S. amphibia* Small.—See Schneider in Bot. Gaz. LXV. 21 and in this Jour. I. 23.—Ball in Bot. Gaz. LXXII. 235 (1921).

11b. **S. longipes** var. **venulosa** Schneider.—See Schneider in this Jour. I. 26.

11c. **S. longipes** var. **Wardii** Schneider.—See Schneider in this Jour. I, 27.

12. **S. Harbisonii** Schneider.—See Schneider in this Jour. I. 29.—It should be mentioned that there has been described a *S. caroliniana* by Michaux, Fl. Bor. Am. II. 226 (1803), from "Carolina et Georgia." He cites *S. pentandra* Walter as a synonym, and that species is the same as *S. nigra* Marshall. From the description it remains uncertain what form Michaux had in mind, and most of the authors have regarded his *caroliniana* as nothing but *nigra*. Nevertheless it might be identical with *S. Harbisonii* but unfortunately no type specimen seems to exist in Michaux's herbarium at Paris.

Sect. V. LONGIFOLIAE Andersson.—See Schneider in Bot. Gaz. LXV. 22; LXVII. 309.

13. **S. taxifolia** Kunth.—? *S. taxifolia* b. *lejocarpa* Andersson.—*S. taxifolia* α *sericocarpa* Andersson.—*S. taxifolia* α *sericocoma* Andersson.—See Schneider in Bot. Gaz. LXV. 23; LXVII. 316,

13b. **S. taxifolia** var. **microphylla** Schneider.—See Schneider in Bot. Gaz. LXV. 24; LXVII. 316.—*S. microphylla* Schlechtendal & Chamisso.—*S. taxifolia* Andersson, pro parte.

14. **S. sessilifolia** Nuttall.—*S. sessilifolia villosa* Andersson.—*S. macrostachya* Nuttall.—*S. macrostachya Cusickii* Rowlee.—*S. longifolia sessilifolia* Jones.—See Schneider in Bot. Gaz. LXVII. 316.

14b. **S. sessilifolia** var. **Hindsiana** Andersson.—*S. Hindsiana* Bentham.—*S. longifolia argyrophylla angustissima* Andersson.—*S. sessilifolia* Sargent, pro parte.—See Schneider in Bot. Gaz. LXVII. 318.

14c. **S. sessilifolia** var. **leucodendroides** Schneider.—*S. macrostachya leucodendroides* Rowlee.—*S. integrifolia leucodendroides* Rowlee.—*S. exigua virens* Rowlee, pro parte.—*S. argophylla* Rowlee, pro parte.—*S. sessilifolia* Britton & Shafer, pro parte.—*S. macrostachya* Abrams, pro parte.—See Schneider in Bot. Gaz. LXVII. 319.[1]

[1] With regard to the footnote given (l. c.) on p. 322 I received the following statement from Mr. Johnston in a letter dated Oct. 28, 1919: "I see in your recent synopsis of the willows of the section Longifoliae (p. 322) that I apparently gave some confusing information. As, no doubt, you suspected the data given in the footnote should refer to my collection No. 1241 from Cucamonga Canyon rather than to my No. 1243 from Red Hill as it is given. Concerning the Red Hill collection (No. 1243) the following data may be given:

15. **S. fluviatilis** Nuttall.—See Schneider in Bot. Gaz. LXVII. 322.

16. **S. Parishiana** Rowlee.—*S. sessilifolia* Jepson, pro parte.—*S. longifolia* var. *argyrophylla* Jepson, pro parte.—*S. argophylla* Abrams, pro parte.—See Schneider in Bot. Gaz. LXVII, 323.

17. **S. argophylla** Nuttall.—*S. macrostachya* Piper.—*S. sessilifolia* Britton & Shafer, pro parte.—See Schneider in Bot. Gaz. LXVII. 325.

18. **S. exigua** Nuttall.—*S. longifolia* var. *β* Hooker, pro parte.—*S. longifolia* Watson, pro parte.—*S. longifolia* var. *exigua* Bebb, pro parte.—*S. longifolia* var. *argyrophylla* Macoun, pro parte.—*S. fluviatilis* var. *exigua* Sargent, pro parte.—*S. longifolia* var. *argophylla* Jones, pro parte.—*S. argophylla* J.K.Henry.—See Schneider in Bot. Gaz. LXV. 25; LXVII. 328.

18b. **S. exigua** var. **nevadensis** Schneider.—*S. nevadensis* Watson.—See Schneider in Bot. Gaz. LXVII. 331.

18c. **S. exigua** var. **stenophylla** Schneider.—*S. Hindsiana tenuifolia* Andersson, pro parte.—*S. longifolia opaca* Anderson, pro parte.—*S. longifolia argyrophylla* Andersson, pro parte.—*S. longifolia* Rothrock.—*S. longifolia exigua* Bebb, pro parte.—*S. fluviatilis exigua* Sargent, pro parte.—*S. fluviatilis argyrophylla* Sudworth, pro parte.—*S. longifolia argophylla* Jones, pro parte.—*S. longifolia interior* Jones, pro parte.—See Schneider in Bot. Gaz. LXV. 25; LXVII. 333.

18d. **S. exigua** var. **luteosericea** Schneider.—*S. luteosericea* Rydberg.—See Schneider in Bot. Gaz. LXVII. 334.

18e. **S. exigua** var. **tenerrima** Schneider.—*S. longifolia tenerrima* Henderson.—*S. tenerrima* Heller.—*S. fluviatilis tenerrima* Howell.—*S. linearifolia* Rydberg, pro parte.—See Schneider in Bot. Gaz. LXVII. 335.

19. **S. melanopsis** Nuttall.—*S. longifolia* Bebb, pro parte.—*S. fluviatilis* Howell, pro parte.—See Schneider in Bot. Gaz. LXVII 336.

19b. **S. melanopsis** var. **Bolanderiana** Schneider.—*S. longifolia* Bebb, pro parte.—*S. Bolanderiana* Rowlee.—*S. exigua virens* Rowlee, pro parte.—*S. argophylla* Rowlee, pro parte.—*S. fluviatilis* Eastwood, pro parte.—See Schneider in Bot. Gaz. LXVII. 338.

20. **S. longifolia** Muhlenberg.—*S. fluviatilis* Sargent, pro parte.—*S. interior* Rowlee.—*S. longifolia integerrima, multidenticulata* et *paucidenticulata* Kuntze.—See Schneider in Bot. Gaz. LXVII. 340.

20a. **S. longifolia** f. **Wheeleri** Schneider.—*S. interior* var. *Wheeleri* Rowlee.—*S. Wheeleri* Rydberg.—*S. longifolia argyrophylla* Auct., pro parte.—*S. fluviatilis* var. *argyrophylla* Auct., pro parte.—See Schneider in Bot. Gaz. LXVII. 342.

"Red Hill is a peculiar small mesa that projects up out of the gravelly and rocky 'wash' or diluvial flood plain of Cucamonga Canyon. It receives surface water from Cucamonga Canyon only during floods and is a good 2½ miles below (south of) its mouth up which about a mile is found the nearest colony of *S. sessilifolia* that I know, this being the one described for my No. 1241. Scattering colonies are found in the lower canyons of the San Antonio Mts. to the north, but southward perhaps the nearest station is along the Santa Ana River over ten miles away. At Red Hill there is only a single, small dense clump of this willow which is situated at the mouth of a small 'draw' some distance up and away from the small main stream that never lasts through the summer. The colony is circular in outline being hardly 25 ft. in diameter. The associated willows are *Salix lasiolepis* and *S. laevigata*. If this Longifoliae-material

20b. **S. longifolia** var. **pedicellata** Andersson.—*S. rubra* Richardson.—*S. longifolia* ? Torrey.—*S. fluviatilis* Sargent, pro parte.—*S. interior* Rowlee, pro parte.—*S. linearifolia* Rydberg, pro parte.—*S. longifolia interior* Jones, pro parte.—See Schneider in Bot. Gaz. LXVII. 344.

20c. **S. longifolia** var. **angustissima** Andersson.—*S. longifolia* *** *opaca* Andersson, pro parte.—*S. longifolia argyrophylla* Andersson, pro parte.—*S. Thurberi* Rowlee.—See Schneider in Bot. Gaz. LXV. 26.

An incertain form of this section is *S. longifolia* var. *sericans* Nees v. Esenbeck mentioned by me in Bot. Gaz. LXVII. 346.

Sect. VI. RETICULATAE Fries.—Sect. *Chamaetia* Dumortier in Bijdr. Nat. Wet. I. 56 (Verh. Gesl. Wilg. 15) (1825).—Sect. *Chamitea* A. et E.-G. Camus, Class. Saul. Eur. I. 129 (1904).—See Schneider in Sargent, Pl. Wilson III. 144 in Bot. Gaz. LXVII. 43.

21. **S. reticulata** Linnaeus.—*S. reticulata glabra* Trautvetter.—*S. reticulata normalis* Andersson.—*S. reticulata typica glabra* Andersson.—*S. orbicularis* Andersson, pro parte.—*Chamitea reticulata* Kerner.—See Schneider in Sargent, Pl. Wilson III. 144 and in Bot. Gaz. LXVII. 44.

21a. **S. reticulata** f. **subrotunda** Seringe.—*S. reticulata* Hoffmann.—*S. orbicularis* Andersson, pro parte,—See Schneider in Bot. Gaz. LXVII. 45.

22. **S. vestita** Pursh.—*S. reticulata vestita* Andersson pro parte.—*S. vestita humilior* Andersson.—See Schneider in Bot. Gaz. LXVII. 45.

22b. **S. vestita** var. **erecta** Andersson.—*S. Fernaldii* Blankinship.—See Schneider in Bot. Gaz. LXVII. 46.

23. **S. leiolepis** Fernald.—See Schneider in Bot. Gaz. LXVII. 46.

24. **S. nivalis** Hooker.—? *S. vestita* β. *nana* Hooker, Fl. Bor. Am. II. 152 (1839).—*S. reticulata nana* Andersson, pro parte.—*S. reticulata nivalis* Andersson.—See Schneider in Bot. Gaz. LXVII. 47.

24b. **S. nivalis** var. **saximontana** Schneider.—*S. reticulata* Bebb.—*S. saximontana* Rydberg.—*S. aemulans* Von Seemen.—See Schneider in Bot. Gaz. LXVII. 47.

To this section may possibly belong the following two very obscure species of which Andersson gave a very insufficient description and of which I have not yet seen the type material: *S. obcordata* Andersson and *S. venusta* Andersson, see Schneider in Bot. Gaz. LXVII. 64.

Sect. VII. HERBACEAE Borrer.—Sect. *Chamaetia* Dumortier, pro parte.—Sect. *Retusae* Kerner.—Sect. *Myrsinites* Schneider, pro parte.—See Schneider in Bot. Gaz. LXVII. 48.

25. **S. polaris** Wahlenberg.—?*S. herbacea* var. *polaris* Kurtz.—See Schneider in Bot. Gaz. LXVII. 49.

25a. **S. polaris** f. **subarctica** Lundström.—See Schneider in Bot. Gaz. LXVII. 49.—? *S. prostrata* Muhlenberg, Cat. Pl. Am. Sept. 91 (1813), nom. nud.

26. **S. Uva-ursi** Pursh.—*S. Cutleri* Tuckerman.—*S. retusa* Oakes ex

under this number is of hybrid origin it must have been carried miles in the seed state before being deposited. It seems to me, though, more likely that it is a descendant of the canyon plants."

Tuckerman in Am. Jour. Sci. ser. 1, XLV. 36 (1843), pro synon.—*S. Cutleri major* et *minor* Andersson.—*S. Cutleri* var. *labradorica* Andersson.—*S. Myrsinites* var. *parvifolia* Lange.—*S. ivigtutiana* Lundström.—See Schneider in Bot. Gaz. LXVII. 50.

26a. **S. Uva-ursi** f. **lasiophylla** Fernald in Rhodora, XVIII. 52 (1916).—I overlooked this form when I dealt with this species in 1919.

I do not enumerate *S. Peasei* Fernald as a species because it is, in my opinion, to be regarded as a hybrid between the foregoing and the following species. See my statements in Bot. Gaz. LXVII. 51.

27. **S. herbacea** Linnaeus.—See Schneider in Bot. Gaz. LXVII. 52.

28. **S. rotundifolia** Trautvetter.—*S. polaris leiocarpa* Chamisso.—*S. retusa rotundifolia* Treviranus.—*S. leiocarpa* Coville.—See Schneider in Bot. Gaz. LXVII. 53.

28a. **S. rotundifolia** f. **pilosiuscula** Schneider.—See Schneider in Bot. Gaz. LXVII. 52.

29. **S. phlebophylla** Anderson.—*S. anglorum* Chamisso, pro parte.—*S. buxifolia* Treviranus.—*S. retusa* Hooker & Arnott.—*S. arctica minor* Ledebour.—*S.* (*retusa*) *phlebophylla* Andersson, includ. f. *major*, f. *minor* et f. *media*, pro parte.—*S. arctica buxifolia* Ledebour.—*S. rotundifolia retusa* Turner.—*S. palaeoneura* Rydberg.—See Schneider in Bot. Gaz. LXVII. 53.

30. **S. Dodgeana** Rydberg.—See Schneider in Bot. Gaz. LXVII. 54.

31. **S. cascadensis** Cockerell.—*S. tenera* Andersson.—*S. phlebophylla* Watson.—*S. arctica petraea* Bebb, pro parte.—*S. Brownii petraea* Bebb, pro parte,—*S. Brownii tenera* Jones.—See Schneider in Bot. Gaz. LXVII. 55.

Sect. VIII. OVALIFOLIAE Rydberg.—Sect. *Arcticae* Rydberg, pro parte.—Sect. *Diplodictyae* Schneider.—See Schneider in Bot. Gaz. LXVII. 56.

32. **S. petrophila** Rydberg.—*S. arctica petraea* Andersson, pro parte.—*S. arctica subalpestris* Andersson.—See Schneider in Bot. Gaz. LXVI. 135.

32a. **S. petrophila** var. **caespitosa** Schneider.—*S. arctica petraea* Bebb, pro parte.—*S. caespitosa* Kennedy.—See Schneider in Bot. Gaz. LXVI. 136.

33. **S. anglorum** Chamisso.—*S. arctica* R. Brown.—*S. arctica Brownei* Andersson, pro parte.—*S. Brownei* Lundström.—*S. Brownii* Bebb.—*S. groenlandica* Rydberg, pro parte.—See Schneider in Bot. Gaz. LXVI, 126.

33b. **S. anglorum** var. **kophophylla** Schneider.—See Schneider in Bot. Gaz. LXVI. 130.

33c. **S. anglorum** var. **araioclada** Schneider.—See Schneider in Bot. Gaz. LXVI. 133.

33d. **S. anglorum** var. **antiplasta** Schneider.—See Schneider in Bot. Gaz. LXVI, 134.

34. **S. arctica** Pallas.—*S. crassijulis* Treviranus.—*S. Pallasii crassijulis* Andersson, incl. f. *oblongata* et *f. grandifolia*.—*S. arctica Brownei*

oblonga Andersson.—*S. arctica Pallasii* Kurtz in Bot. Jahrb. XIX. 74 (1894).—*S. arctica* f. *longijulis* Lundström apud Kjellman in Nordenskiöld, Vega Exp. Vet. Jakttagel. II. 51 (Fanerog. Vest-Eskimaernas Land) (1883).—See Schneider in Bot. Gaz. LXVI. 118.

34a. **S. arctica** f. **diplodictya** Schneider, trans. nov.*—*S. diplodictya* Trautvetter.—*S. Pallasii* var. *diplodictya* Andersson, pro parte.—*S. arctica* var. *Pallasii* f. *diplodictya* Kurtz in Bot. Jahrb. XIX. 474 (1894).—See Schneider in Bot. Gaz. LXVI. 56.

34b. **S. arctica** var. **glabrata** Trautvetter. See Schneider in Bot. Gaz. LXVI. 122.

34c. **S. arctica** var. **subcordata** Schneider.—*S. cordifolia* Hooker, pro parte.—*S. subcordata* Andersson.—*S. obovata glabra* Barratt.—See Schneider in Bot. Gaz. LXVI. 123.

Salix arctica var. *obcordata* Rydberg (*S. Pallasii* α *crassijulis* 3. *obcordata* Andersson.—*S. Pallasii* var. *obcordata* Turner) see Schneider in Bot. Gaz. LXVI. 122.

Salix arctica var. *subphylicifolia*, var. *subreticulata* and var. *subpolaris* Andersson see Schneider in Bot. Gaz. LXVI. 120.

35. **S. ovalifolia** Trautvetter.—*S. myrtilloides* f. 4. Chamisso.—*S. unalaschkensis* Chamisso ex Andersson.—*S. rotundata* Rydberg.—*S. cyclophylla* Rydberg.—See Schneider in Bot. Gaz. LXVI. 138.—To the typical *S. ovalifolia* probably also belongs *S. myrtilloides* f. 3. Chamisso in Linnaea, v. 539 (1831) which Andersson first described as *S. ovalifolia major* in Öfv. Svensk. Vet.-Akad. Forh. 131 (1858); in Proc. Am. Acad. IV. 72 (Sal. Bor.-Am. 26) (1858); in Walpers. Ann. Bot. 755 (1858), and later as *S. fuscescens* β ? *minor* in De Candolle, Prodr. XVI². 230 (1868). According to Chamisso it came "e sinu Schischmareffii" (Shishmaref Inlet) in Alaska.

35b. **S. ovalifolia** var. **pubescens** Andersson.—See Schneider, in Bot. Gaz. LXVI. 138.

35c. **S. ovalifolia** var. **subarctica** Lundström.—*S. diplodictya* Rydberg.—See Schneider in Bot. Gaz. LXVI. 139.

35d. **S. ovalifolia** var. **camdensis** Schneider.—See Schneider in Bot. Gaz. LXVI. 139.

36. **S. stolonifera** Coville.—*S. unalaschensis* Rydberg.—See Schneider in Bot. Gaz. LXVI. 137; LXVII. 57.

36a. **S. stolonifera** f. **subpilosa** Schneider.—See Schneider in Bot. Gaz. LXVI. 137.

37. **S. arctophila** Cockerell.—*S. arctica* Liebmann.—*S. arctica* γ *Groenlandica* Andersson, incl. f. *hebecarpa, latifolia, angustifolia et macrocarpa* et ? *pusilla*.—*S. groenlandica* Lundström.—*S. groenlandica hebecarpa, latifolia* et *angustifolia* et ? *pusilla* et ? *minutifolia* Lange.—*S. anglorum* Rydberg, pro parte.—See Schneider in Bot. Gaz. LXVI. 140 (sub *S. groenlandica*); LXVII. 57.

* For explanation of the terms "trans. nov." (translatio nova, new transfer) and "stat. nov." (status novus, new status) see Bailey, Gentes Herb. I. 8 (1920).

37b. **S. arctophila** var. **lejocarpa** Schneider.—*S. arctica groenlandica lejocarpa* Andersson.—*S. groenlandica lejocarpa* Lange.—See Schneider in Bot. Gaz. LXVI. 141; LXVII. 57.

38. **S. hudsonensis** Schneider.—*S. Macounii* Rydberg, pro parte.—?*S. fullertonensis* × *S. groenlandica* Schneider.—See Schneider in Bot. Gaz. LXVI. 342; LXVII. 57.

To this section apparently also belongs *S. glacialis* Andersson (*S. Uva-ursi* Seemann, pro parte) which seems to be closely related to *S. ovalifolia* but as long as its male flowers are unknown its taxonomic value and its true affinity remain doubtful. See Schneider in Bot. Gaz. LXVII. 63.

Sect. IX. GLAUCAE Fries.—Sect. *Arcticae* Rydberg, pro parte.—See Schneider, in Bot. Gaz. LXVI. 318; LXVII. 58.

39. **S. fullertonensis** Schneider in Bot. Gaz. LXVI. 340.

40. **S. chlorolepis** Fernald.—See Schneider in Bot. Gaz. LXVI. 338; LXVII. 60.

40b. **S. chlorolepis** var. **antimima** Schneider.—*S. desertorum* Fernald.—See Schneider in Bot. Gaz. LXVI. 339.

41. **S. brachycarpa** Nuttall.—*S. desertorum* Andersson, incl. var. *stricta* et var. *fruticulosa*, sed prob. excl. var. *elata*.—*S. stricta* Rydberg.—? *S. desertorum* var. *acutifolia* Barratt, Herb.—See Schneider in Bot. Gaz. LXVI. 336.

41b. **S. brachycarpa** var. **glabellicarpa** Schneider in Bot. Gaz. LXVI. 338.

42. **S. niphoclada** Rydberg.—See Schneider in Bot. Gaz. LXVI. 339; LXVII. 50.

43. **S. desertorum** Richardson.—*S. glauca* * *S. desertorum* Andersson.—See Schneider in Bot. Gaz. LXVI. 331.

44. **S. pseudolapponum** Von Seemen.—*S. glauca villosa* Andersson, pro parte.—*S. glaucops* Rydberg, pro parte.—*S. desertorum* Ball, pro parte.—*S. Wolfii* var. *pseudolapponum* Jones, pro parte.—See Schneider in Bot. Gaz. LXVI. 334.

45. **S. Maccalliana** Rowlee.—See Schneider in this Jour. II. 89.

46. **S. glauca** Linnaeus.—See Schneider in Bot. Gaz. LXVI. 319.

46a. **S. glauca** var. **acutifolia** Schneider.—*S. glauca* Richardson.—*S. villosa* Barratt.—*S. villosa* var. *acutifolia* Hooker.—*S. glauca* var. *villosa* Andersson, pro parte.—*S. glaucops* Andersson and var. α *villosa* Andersson, pro parte.—? *S. glauca subarctica* Kjellman.—*S. Seemannii* Rydberg.—*S. glauca* var. *Seemanii* Ostenfeld.—See Schneider in Bot. Gaz. LXVI. 327; LXVII. 60.—To the variety probably belongs also as a synonym *S. Stuartiana* Hooker. Fl. Bor.-Am. II: 151 (1839), incl. var. β, non Smith. It had been collected by Beechey on Kotzebue's Sound and var. β by Richardson on the Mackenzie River.

46b. **S. glauca** var. **acutifolia** f. **poliophylla** Schneider in Bot. Gaz. LXVII. 61.

46c. **S. glauca** var. **glabrescens** Schneider.—*S. glaucops* var. *glabrescens*

Andersson.—*S. Austinae* Rydberg, pro parte.—See Schneider in Bot. Gaz. LXVI. 329.

46d. **S. glauca** var. **ovalifolia** Lange—*S. glauca sericea ovalifolia* Andersson.—See Schneider in Bot. Gaz. LXVI. 351.—Lange also enumerated the following varieties: var. *sericea*, var. *appendiculata*, var. *angustifolia* (? *S. glauca* α *sericea* var. *angustifolia* Anderss.) and var. *alpina* from Greenland of which I have spoken, l. c. These forms need a very close investigation, and I strongly believe, as I have already said, in Bot. Gaz. LXVI. 353, that the true *S. glauca* is entirely absent from eastern North America, and that it is here represented by *S. cordifolia* and its varieties, and by *S. anamesa*.

47. **S. cordifolia** Pursh.—*S. callicarpaea* Trautvetter.—*S. planifolia* Hooker.—*S. alpestris c. americana* Andersson.—*S. arctica* β *Brownei* 3° *fumosa* Andersson.—*S. glauca* Rydberg, pro parte.—*S. Waghornei* Rydberg, pro parte.—*S. labradorica* Rydberg, pro parte.—See Schneider in Bot. Gaz. LXVI. 343.

47a. **S. cordifolia** f. **hypoprionota** Schneider in Bot. Gaz. LXVI. 346.

47b. **S. cordifolia** f. **atra** Schneider.—*S. atra* Rydberg.—See Schneider in Bot. Gaz. LXVI. 346.[1]

47c. **S. cordifolia** var. **Macounii** Schneider.—*S. Macounii* Rydberg.—*S. Rydbergii* Heller.—*S. vacciniformis* Rydberg.—See Schneider in Bot. Gaz. LXVI. 347.

48. **S. anamesa** Schneider.—*S. glauca* Lange, pro parte.—See Schneider in Bot. Gaz. LXVI. 348.

49. **S. lingulata** Andersson.—See Schneider in Bot. Gaz. LXVI. 353.

Gandoger, (Fl. Eur. XXI. 157–158 [1890]), has proposed as what should be called subspecies of *S. glauca* the following names for forms from Greenland: *S. eskimorum*, *S. groenlandica*, *S. platycarpa*, and *S. Vahlii*. His descriptions are very unsatisfactory, and these forms cannot be regarded as species in our sense. I have not yet seen the types but I suppose that these specimens only represent forms of *S. anamesa*.

Sect. X. WOLFIANAE, sect. nov.—Sect. *Commutatae* Ball apud Coulter & Nelson, New Man. Rocky Mts. Bot. 134 (1909), pro parte.—Frutices ut videtur satis parvi, erecti, ramis divaricatis. Folia matura firma sed tenuia, lanceolata, oblanceolata, rhomboideo-oblanceolata and elliptico-lanceolata, saepissime integerrima, utrinque concoloria et subaequaliter stomatifera, plusminusve argenteo-sericea. Amenta plus-

[1] This form seems to bear some affinity to *S. macrocarpa* Andersson in Öfv. Svensk. Vet.-Akad. Förh. XV. 124 (1858), non Nuttall; in Proc. Am. Ac. IV. 64 (Sal. Bor.-Am. 19) (1858); in Svensk. Vet.-Akad. Handl. VI. t. 7, f. 76 (mala) (1867); in DeCandolle, Prodr. XVI.[2] 245 (1868), which is based on a specimen collected by Burke, Hudson Bay, and has nothing to do with *S. macrocarpa* Nuttall (= *S. Geyeriana* And.). I have seen a photograph and fragments of the type (Herb. K.). It bears rather old fruiting aments, and agrees well with Andersson's description. The pedicels are almost as long as the bracts and densely hairy while the ovaries (fruits) are glabrous or nearly so. A specimen collected by J. M. Macoun, at Churchill, on July 30, 1910 (No. 79159, fr.; A., Cor., O.) has rather similar but entirely pubescent fruits. These forms from the Hudson Bay Region need a careful study, and I am at present unable to interpret Andersson's form correctly.

minusve coetanea, brevissime pedunculata, parva, ellipsoidea, densiflora; flores masculi diandri, filamentis glabris liberis, antheris flavis, glandulis duobus, ventrali ovoideo-rectangulari, dorsali minore filiformi saepe minima, bracteis atrofuscis; feminei fructusque subsessiles, glabri; styli breves vix ad 1 mm. longi, stigmatibus minimis bifidis; glandula 1, ventralis, ut in masculis; fructus e basi ovoideo-rhomboidali conico-subrostrati 4–5.5 mm. longi.

As I have already explained in this Jour. I. 229, *S. Wolfii* represents a rather peculiar type among American Willows, especially on account of the presence of a dorsal gland in the male flowers. I, therefore, thought it best to propose a new section for it.

50. **S. Wolfii** Bebb.—See Schneider, l. c. in this Jour. I. 329.

50b. **S. Wolfii** var. **idahoensis** Ball.—See Schneider in this Jour. I. 231.

Sect. XI. Mexicanae Schneider, sect. nov.—Frutices ut videtur mediocres, erecti, ramulis satis elongatis strictis divaricatis. Folia matura firma, satis crasse chartacea, elongato-lanceolata ad anguste-elliptico-lanceolata, glanduloso-denticulata, pubescentia vel glabra. Petioli breves, 2–8 mm. longi. Amenta autumno in axillis foliorum adultorum apparentia, sessilia, breviter cylindrica, densiflora. Bracteae brunnescentes. Flores masculi diandri, filamentis glabris liberis, antheris flavis, glandulis duobus ventrali-ovoideo-rectangulari, dorsali simili minore; feminei ovoideo-conici, glabri, pedicello distincto glabro dimidio ovarii sublongiore suffulti; styli distincti, sed breves stigmatibus oblongis bifidis subaequilongi; glandula 1, ventralis ut in masculis; fructus ovoideo-oblongi, subrostrati, circ. 4 mm. longi pedicello 1.5–2 mm. longo excluso.—The two species of this new section may have their closest affinity with those of Sect. *Cordatae* but they possess a dorsal gland in the male flowers and represent a rather well marked group among the American Willows. As I have already pointed out in Bot. Gaz. LXV. 29 (1918) the late time of flowering cannot be regarded as a valuable taxonomic character because there are spring flowering forms of *S. mexicana*, and of *S. lasiolepis* there are known forms of southern California flowering in the fall.

51. **S. Hartwegii** Bentham.—*S. humilis* * *S. Hartwegii* Andersson.—*S. humilis* ♂ ? *Hartwegii* Andersson.—See Schneider in Bot. Gaz. LXV. 28.

52. **S. mexicana** Von Seemen.—See Schneider in Bot. Gaz. LXV. 29.—In the Herbarium of the Botanical Museum at Berlin-Dahlem I have seen all the specimens mentioned by Von Seemen. The type was collected by Berlandier at Zacualtipan, State of Hidalgo, and is No. 307. It consists of a sterile shoot only. The specimen is marked by Andersson "Sal. amygdaloides vel Sal. daphnoides?." The male syntype is a specimen collected by C. Ehrenberg (No. 267) at "S. Pietro & S. Paolo," the fruiting syntype is Uhde's No. 329, "Mexico 1846" without an exact locality.

53. **S. Schaffnerii** Schneider in Bot. Gaz. LXV. 30 (1918).—The male plant being unknown, the systematic position of this species remains doubtful.

Sect. XII. CORDATAE Barratt.—See Schneider in this Jour. II. 185.

54. **S. irrorata** Andersson.—See Schneider in this Jour. II. 186.

55. **S. lasiolepis** Bentham.—See Schneider in this Jour. II. 187.

55b. **S. lasiolepis** var. **Bigelowii** Bebb.—See Schneider in this Jour. II. 188.

55c. **S. lasiolepis** var. **Bakeri** Ball in Bot. Gaz. LXXI. 436 (1921).—See also Schneider in this Jour. II. 188 (1922).

56. **S. ligulifolia** Ball.—See Schneider in this Jour. II. 188.

57. **S. cordata** Muhlenberg.—See Schneider in this Jour. II. 189.

57b. **S. cordata** var. **angustata** Andersson.—See Schneider in this Jour. II. 190.

58. **S. missouriensis** Bebb.—*S. cordata* var. *missouriensis* Mackenzie & Bush in Mackenzie, Man. Fl. Jackson Co., Mo. 69 (1902).—See Schneider in this Jour. II. 190.

59. **S. mackenzieana** Barratt.—See Schneider in this Jour. II. 190.

59b. **S. mackenzieana** var. **macrogemma** Ball.—See Schneider in this Jour. II. 191.

60. **S. lutea** Nuttall.—See Schneider in this Jour. II. 191.[1]

60a. **S. farrae** Ball apud Standly in Contr. U. S. Nat. Herb. XXII. 321 .(1921). This new species represents a Willow from the "Rocky Mts. of southern Alta. and B. C. and northern Mont." "Frequent on the eastern slope at middle altitudes or about timber line; in bogs or wet meadows." It seems to be most closely allied to *S. lutea* the variations or which we are far from knowing sufficiently. I suppose that Ball has already published a good description of his new species because his statements in Standley's Flora are very incomplete. I do not know what Willow he really has in mind.[2]

61. **S. monochroma** Ball in Bot. Gaz. LXXI. 431, fig.1 (1921). —See also Schneider in this Jour. II. 192 (1922).

62. **S. myrtillifolia** Andersson.—See Schneider in this Jour. II. 193.

[1] **S. lutea** var. **famelica** Ball in Bot. Gaz. LXXI. 426 (1921).—"This variety differs from *S. lutea* chiefly in the very small and more strongly nerved leaves." Specimens are enumerated from South and North Dakota and Montana.

S. lutea var. **ligulifolia** Ball in Bot. Gaz. LXXI. 428 (1921).—*S. cordata* Bebb, Willows Calif. 85 (1879), pro parte; in Coulter Man. Bot. Rocky Mt. Reg. 335 (1885), pro parte.—*S. cordata Watsonii* Ball in Coulter & Nelson, New Man. Rocky Mt. Bot. 132 (1909), pro parte.—This variety "is distinguished from typical *S. lutea* by usually dark brown branchlets, longer and narrower, straplike, usually dark green leaves with the margins often nearly parallel and usually entire or only shallowly serrulate. The capsules also are shorter and on fairly short pedicels." Specimens are enumerated from California, Nevada, Arizona, Utah, New Mexico, Colorado, South Dakota and Wyoming.

S. lutea var. **platyphylla** Ball in Bot. Gaz. LXXI. 430 (1921).—*S. cordata* var. Bebb in King, U. S. Geol. Explor. 40th Parallel, v. 325 (1871).—This variety "is separated from *S. lutea* by the broad ovate-lanceolate leaves and the more elongated pedicels 1.5–2.5 or 3 mm. long." Specimens are enumerated from Utah, Wyoming, Idaho, Oregon, Nevada.—ED.

[2] **S. Farrae** var. **Walpoleii** Coville & Ball in Bot. Gaz. LXXI. 435 (1921).—"*Salix Farrae Walpoleii* is separated readily from the species by the pubescent pilose young twigs, the broader, more obovate leaves, the longer and laxer aments, and the shorter styles." It is known only from Alaska.—See also note on *S. Walpolei* in this Jour. I. 152.—ED.

62b. S. **myrtillifolia** var. **brachypoda** Fernald.—See Schneider in this Jour. II. 195.

62c. S. **myrtillifolia** var. **lingulata** Ball.—See Schneider in this Jour. II. 195.

63. S. **pseudocordata** Rydberg.—See Schneider in this Jour. II. 195.

63b. S. **pseudocordata** var. **aequalis** Ball.—See Schneider in this Jour. II. 196.

63c. S. **pseudocordata** var. **cordata** Ball.—See Schneider in this Jour. II. 196.

Sect. XIII. ADENOPHYLLAE Schneider.—See Schneider in this Jour. I. 148.

64. S. **Chamissonis** Andersson.—*S. myrsinites* Chamisso.—See Schneider in this Jour. I. 149.

65. S. **Barclayi** Andersson.—See Schneider in this Jour. I. 150.—To this species also belongs according to specimens I have seen a Willow cultivated in European gardens under the name *S. Hoyeriana* Dieck (Neuheiten Offerte Nat. Arb. Zoeschen, 1889-90, 17). It has been mentioned by Dippel, Handb. Laubholzk. II. 285 (1892) as follows: *S. pyrolaefolia* var. "a. *Hoyeriana*, Hoyer's Weide. Diese von dem Reisenden Dr. Dieck's, Leutn. Hoyer, in dem Kaskadengebirge und zwar in dem Hochthal des Styn Creek,[1] einem Nebenflusse des Fraser aufgefundene, in den Zoeschener Baumschulen bereits kultivierte, von dort mir mitgeteilte, von Dr. Dieck *Sal. Hoyeriana* benannte (Neuheiten-Offerte 1889), von mir in Briefen als *Sal. pyrolaefolia* var. *cordata* Ledeb. form. *occidentalis* bezeichnete Weide gehört offenbar hierher und steht der *Sal. pyrolaefolia* γ *cordata* (*Sal. pyrolaefolia* γ *sabulosa*, *Sal. sabulsoa* Turczan. in herb.) sehr nahe."

65b. S. **Barclayi** var. **angustifolia** Andersson.—As I explained in this Jour. I. 151, this form may be identical with *S. conjuncta* Bebb and *S. Barclayi* var. *conjuncta* Ball.

65c. S. **Barclayi** var. **hebecarpa** Andersson.—See Schneider in this Jour. I. 151.

The form described by Andersson as *S. Barclayi* β, *latiuscula* is still absolutely uncertain, as I have already explained in this Jour. I, 152. Unfortunately the type is wanting in Herb. De Candolle at Geneva from which Andersson had received it. I doubt if *S. latiuscula* Fernald is really the same as Anderson's form.

To *S. Barclayi* may belong *S. cordifolia* β. *serrulata* Barratt.—See Schneider in Bot. Gaz. LXVI. 124.

66. S. **monticola** Bebb.—See Schneider in this Jour. I. 154 (1920).

66a. S. **pseudomonticola** Ball apud Standley in Contrib. U. S. Nat. Herb. XXII. 321 (1921). From Ball's short description I am unable to judge the real taxonomic value of this new species. He does not cite a

[1] I have not succeeded in finding a creek or river, situated northwest of Lytton according to Dieck (l. c.), bearing this name on any map of British Columbia at my disposal.

type, and I presume that he has published a complete diagnosis somewhere else. According to the statement "styles 1 mm. long" his species belongs to Sect. Adenophyllae, and must, indeed, be very similar to *S. monticola.*

67. S. **glaucophylloides** Fernald.—See Schneider in this Jour. I. 156.

67b. S. **glaucophylloides** var. **glaucophylla** Schneider.—See Schneider, in this Jour. I. 157.

68. S. **adenophylla** Hooker.—See Schneider in this Jour. I. 158.

69. S. **commutata** Bebb.—See Schneider in this Jour. I. 160.

69. S. **commutata** var. **sericea** Bebb.—See Schneider in this Jour. I. 160.

69. S. **commutata** var. **denudata** Bebb.—See Schneider in this Jour. I. 161.

69. S. **commutata** var. **puberula** Bebb.—See Schneider in this Jour. I. 162.

70. S. **Eastwoodiae** Cockerell.—See Schneider in this Jour. I. 163.

70b. S. **Eastwoodiae** var. **callicoma** Schneider in this Jour. I. 164.

71. S. **orestera** Schneider in this Jour. I. 164.

Sect. XIV. BALSAMIFERAE Schneider in this Jour. I. 167.

72. S. **pyrifolia** Andersson.—See Schneider in this Jour. I, 168.—Of Andersson's type (var. *laeta*) I have seen fragments of Bourgeau's male specimen from Winnipeg (Marais de la rivière aux Brochet, 22 June 1859) and also his female plant from Saskatchawan (Fort Pitt, 1859) preserved in the Herbarium at Stockholm in the Berlin Herbarium. Here is also a sterile piece of the type of Andersson's *S. pyrifolia *obscura*, collected by Bourgeau on Aug. 23, 1858, at "Vallée des Arcs" in the (Canadian) Rocky Mountains. I am unable to ascertain the identity of this really obscure form not having seen the capsules described by Andersson.

73. S. **obtusata** Fernald.—See Schneider in this Jour. I. 171.

Sect. XV. CHRYSANTHEAE Koch.—See Schneider in this Jour. I. 212.

74. S. **Richardsonii** Hooker.—See Schneider in this Jour. I. 214.

75. S. **calcicola** Fernald.—See Schneider in this Jour. I. 215.—In the herbarium at Berlin-Dahlem I have seen a specimen from Labrador collected by Barth in 1847, but the exact locality is not given.

76. S. **Barrattiana** Hooker.—See Schneider in this Jour. I. 216.

76b. S. **Barrattiana** var. **Tweedyi** Bebb.—See Schneider in this Jour. I. 217.

77. S. **amplifolia** Coville.—See Schneider in this Jour. I. 218.

78. S. **Hookeriana** Barratt.—See Schneider in this Jour. I. 219.

78b. S. **Hookeriana** var. **laurifolia** J. K. Henry.—See Schneider in this Jour. I. 219.

78c. S. **Hookeriana** var. **tomentosa** J. K. Henry.—See Schneider in this Jour. I. 220.

79. S. **Piperi** Bebb.—See Schneider in this Jour. I. 221.

80. S. **laurentiana** Fernald.—See Schneider in this Jour. I. 222.

81. **S. alaxensis** Coville. See Schneider in this Jour. I. 223.—In the herbarium at Dahlem-Berlin I have seen the type of *S. Barrattiana vestita* Kurtz which I had referred with a ? to *S. alaxensis* (l. c.). It is a male specimen with some androgynous catkins, and represents typical *alaxensis*.

81b. **S. alaxensis** var. **longistylis** Schneider in this Jour. I. 225.

Sect. XVI. Candidae Schneider in this Jour. I. 226.

82. **S. candida** Flügge.—See Schneider in this Jour. I. 226.

82b. **S. candida** var. **denudata** Andersson.—See Schneider in this Jour. I. 227.

83. **S. cryptodonta** Fernald in Rhodora XVI. 172 (1914).—This is the second Willow mentioned by me (in this Jour. I. 226) although I did not enumerate it. So far as I know there is only the type which was collected by Fernald & Wiegand in Newfoundland "by rapids below Seal Pond, Birchy Pond Stream, East Bank of Humber" on July 14, 1910 (No. 4267, fr.; G.). Fernald says that it is most closely related, apparently, to *S. californica* Bebb (= *S. Eastwoodiae*). In my opinion, this Willow does not belong to the Commutatae, and resembles in its pubescence a good deal *S. candida*. Unfortunately the male flowers and young female flowers are still unknown. Fernald states that the pedicel is "much longer than the nectary and barely shorter than the scale." According to my own observations the pedicel is from two to four times longer than the gland and mostly only half as long as the bracts. Without the pedicel the capsules measure about 7 mm. in length (Fernald says 8–10 mm., probably including the pedicel). The branches are not distinctly fuscous and shining. I add this little known species only provisionally to this section.

Sect. XVII. Fulvae Barratt.—See Schneider in this Jour. II. 66.

84. **S. Bebbiana** Sargent.—See Schneider in this Jour. II. 66.

84a. **S. Bebbiana** f. **luxurians**, stat. nov.—*S. rostrata* var. *luxurians* Fernald.—See Schneider in this Jour. II. 72.

84b. **S. Bebbiana** f. **capreifolia**, stat. nov.—*S. rostrata* var. *capreifolia* Fernald.—See Schneider in this Jour. II. 71.

84c. **S. Bebbiana** var. **perrostrata** Schneider in this Jour. II. 71.

84d. **S. Bebbiana** var. **projecta**, trans. nov.—*S. rostrata* var. *projecta* Fernald.—See Schneider in this Jour. II. 71.

85. **S. Geyeriana** Andersson.—See Schneider in this Jour. II. 71.

85b. **S. Geyeriana** var. **argentea** Schneider in this Jour. II. 74.

85c. **S. Geyeriana** var. **meleina** J. K. Henry.—See Schneider in this Jour. II. 74.

86. **S. Lemmonii** Bebb.—See Schneider in this Jour. II. 75.

86b. **S. Lemmonii** var. **Austinae** Schneider in this Jour. II. 79.

Sect. XVIII. Roseae Andersson.—See Schneider in this Jour. II. 81.

87. **S. pedicellaris** Pursh.—See Schneider in this Jour. II. 81.—As I have already pointed out I regard as the typical *pedicellaris* the form named

by Fernald var. *hypoglauca*. I am not yet convinced that there is a good variety with leaves green on both surfaces which according to Fernald should be taken for the type. The specimens of it mentioned by Fernald need further observation. His var. *tenuescens* is in my opinion nothing but a mere form.

87a. S. **pedicellaris** f. **tenuescens**, stat. nov.—*S. pedicellaris* var. *tenuescens* Fernald.—See Schneider in this Jour. II. 82.

88. S. **prolixa** Andersson.—See Schneider in this Jour. II. 82.

89. S. **fuscescens** Andersson.—See Schneider in this Jour. II. 83.

89b. S. **fuscescens** var. **hebecarpa** Fernald.—See Schneider in this Jour. II. 84.

Sect. XIX. GRISEAE Borrer.—See Schneider in this Jour. II. 14.

90. S. **sericea** Marshall.—See Schneider in this Jour. II. 14.

91. S. **coactilis** Fernald.—See Schneider in this Jour. II. 16.

92. S. **petiolaris** Smith.—See Schneider in this Jour. II. 16.

92b. S. **petiolaris** var. **rosmarinoides** Schneider in this Jour. II. 19.

93. S. **humilis** Marshall.—See Schneider in this Jour. II. 20.

93b. S. **humilis** var. **rigidiuscula** Robinson & Fernald.—? *S. humilis* var. *longifolia* f. *rigidiuscula* Andersson.—See Schneider in this Jour. II. 22. In his Fl. Europ. XXI. 168 (1890), Gandoger proposed under *S. tristis* four subspecies *S. dasytricha*, *S. graciliflora*, *S. iodanthera* and *S. leucodendron* which partly are nothing but typical *S. tristis*. Some may represent hybrids or forms of *S. humilis*.[1]

94. S. **tristis** Aiton.—See Schneider in this Jour. II. 24.

Sect. XX. DISCOLORES Barratt.—See Schneider in this Jour. II. 2.

95. S. **discolor** Muhlenberg.—See Schneider in this Jour. II. 2.

95a. S. **discolor** f. **rigidior** Anderson.—See Schneider in this Jour. II. 3.

95b. S. **discolor** var. **latifolia** Andersson.—See Schneider in this Jour. II. 3.

96. S. **Scouleriana** Barratt.—See Schneider in this Jour. II. 6.

96a. S. **Scouleriana** f. **poikila**, stat. nov.—*S. Scouleriana* var. *flavescens* J. K. Henry.—*S. Scouleriana* var. *poikila* Schneider in Jour. Arnold Arb. II. 12 (1920).

96b. S. **Scouleriana** var. **crassijulis** Schneider in this Jour. II. 12.—*S.(aurita?) brachystachys* Andersson in Ofv. Svensk. Vet.-Akad. Forh. XV. 121 (1858); in Proc. Am. Acad. IV. 60 (Sal. Bor.-Am. 15) (1858); in Walpers, Ann. Bot. 749 (1858).

97. S. **paradoxa** Kunth.—See Schneider in Bot. Gaz. LXV. 35 (1918).—As I have already stated (in this Jour. II. 13 [1920]) this Mexican species needs further observation. In Herb. Berol. I have seen some interesting specimens which probably belong to it. There is also Ehrenberg's No. 266 from Mineral del Monte (State ?) of which the pubescence of the

[1] *S. humilis* var. *keweenawensis* Farwell in Rep. Mich. Acad. Sci. VI. 206 (1904).—This form not mentioned by Schneider is described as a low form with the mature leaves densely tomentose.—Ed.

ovaries and fruits is very ferrugineous. It may represent a new species. In the mountains of Mexico there occur probably some more Willows, and also of those hitherto found our knowledge is rather imperfect. I already mentioned in Bot. Gaz. LXV. 39, the obscure *S. cinerea* Sesse & Moçino, non Linnaeus.

97b. **S. paradoxa** var. **ajuscana** Schneider.—*S. Pringlei* Rowlee, pro parte.—See Schneider in Bot. Gaz. LXV. 37.

98. **S. oxylepis** Schneider.—*S. latifolia* Martens & Galeotti.—See Schneider in Bot. Gaz. LXV. 34.

99. **S. Rowleei** Schneider.—*S. cana* Rowlee, pro parte.—See Schneider in Bot. Gaz. LXV. 31.

99b. **S. Rowleei ?** var. **cana** Schneider.—*S. cana* Rowlee, pro parte.—See Schneider in Bot. Gaz. LXV. 34.

An uncertain Willow probably closely related to the last one or representing a form or hybrid is *S. Pringlei* Rowlee. See Schneider in Bot. Gaz. LXV. 37.

Sect. XXI. PHYLICIFOLIAE Dumortier.—See Schneider in this Jour. I. 67.

100. **S. pulchra** Chamisso.—See Schneider in this Jour. I. 70.

100b. **S. pulchra** var. **yukonensis** Schneider in this Jour. I. 72.

101. **S. paraleuca** Fernald.—See Schneider in this Jour. I. 75.

102. **S. planifolia** Pursh.—See Schneider in this Jour. I. 75.—I also want to add a few words on the obscure *S. obovata* Pursh, Fl. Am. Sept. II. 611 (1814), which I mentioned when I dealt with *S. cordifolia* in Bot. Gaz. LXVI. 344 (1918). Pursh's species has been based on two different forms, one from Labrador collected by Colmatser, and the second from the "North West Coast. Nelson." It may be that the first specimen represents either *S. cordifolia* or *S. planifolia*, but it is impossible to ascertain the identity of the two forms mixed by the author without seeing his types which, unfortunately, seem to be lost.[1]

102b. **S. planifolia** var. **monica** Schneider in this Jour. I. 78.

103. **S. pennata** Ball.—See Schneider in this Jour. I. 81.

104. **S. pellita** Andersson.—See Schneider in this Jour. I. 82.

104a. **S. pellita f. psila** Schneider in this Jour. I. 83.

105. **S. subcoerulea** Piper.—See Schneider in this Jour. I. 84.

106. **S. bella** Piper.—See Schneider in this Jour. I. 86.

107. **S. Drummondiana** Barratt.—See Schneider in this Jour. I. 87.

108. **S. Jepsonii** Schneider in this Jour. I. 89.

Sect. XXII. BREWERIANAE Schneider in this Jour. I. 95.

109. **S. Breweri** Bebb.—See Schneider in this Jour. I. 95.

[1] In discussing, l. c., Andersson's *S. chlorophylla* I forgot to mention two of his forms described in 1867, as *S. chlorophylla denudata latifolia* and *angustifolia*. The last is nothing but var. *denudata* (typical *S. planifolia*), but of *f. latifolia* he says: "foliis obovatis, utrinque pure viridibus." Not quoting a type or even a locality it remains doubtful which form Andersson had in mind.

S. Nelsonii Ball which seems to be a species most closely related to or a variety of *S. planifolia* has been discussed by me (in this Jour. I. 80).

110. **S. delnortensis** Schneider in this Jour. I. 96.

Sect. XXIII. SITCHENSES Bebb.—See Schneider in this Jour. I. 91.

111. **S. sitchensis** Sanson.—See Schneider in this Jour. I. 92.

112. **S. Coulteri** Andersson.—See Schneider in this Jour. I. 93.

112b. **S. Coulteri f. parvifolia**—See Schneider in this Jour. I. 95.

SPECIES SECTIONIS INCERTAE.

113. **S. arbusculoides** Andersson.—See Schneider in this Jour. II. 84 (1920).

113b. **S. arbusculoides** var. **glabra** Andersson.—See Schneider in this Jour. II. 87.

114. **S. argyrocarpa** Anderson.—See Schneider in this Jour. II. 88.

115. **S. cana** Martens & Galeotti.—See Schneider in Bot. Gaz. LXV. 38.

116. **S. Endlichii** Von Seemen.—See Schneider in Bot. Gaz. LXV. 39.—I have not been able to find the type of this species in the herbarium at Berlein-Dahlem where it should be preserved.

BERLIN-DAHLEM, *March*, 1921.

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b. SOME REMARKS ON THE HYBRIDS HITHERTO OBSERVED AMONG THE AMERICAN WILLOWS

As I have already repeatedly stated I have not been able to make careful study of the forms which should be regarded as of hybrid origin. Nevertheless I wish to give an alphabetical enumeration of what has been mentioned in literature, and of those hybrids which according to my own observations seem to occur. I have to express my best thanks to Mr. A. Töpffer, the famous salicologist, at Munich, who has been kind in helping me compile for my personal use a list of the publications referring to such hybrids.

S. adenophylla × *S. cordata.* In 1880, Bebb had already collected and distributed specimens of this hybrid under no. 60 of his Herb. Salic. Am. It is first mentioned in Britton & Brown, Ill. Fl. III. 504 (1898).

? S. alaxensis × *S. Scouleriana.* A specimen which might be of this origin was collected by J. Macoun on June 22, 1902, in Yukon Territory, Hunker Creek (No. 54387, 0.).

S. alba [subsp.]—*S. Pameachiana* Andersson in K. Svensk. Vet.-Akad. Handl. VI. 48. (Monog. Salic.) 1867).—*S. alba* γ *Pameachiana* Andersson in De Candolle, Prodr. XVI², 212 (1868).—According to Bebb in Gard. & Forest VIII. 423, fig. 57 (1895), Andersson's *S. Pameachiana* represents a hybrid between *S. alba* and *S. lucida*, and it is not identical with *S. pameachiana* Barratt (not "Borr." as Andersson writes). Barratt's plant of which I do not know the type may belong to *S. alba* var. *vitellina* (as Carey said in Gray, Man. 428 [1848] or to *S. fragilis*, an opinion first held by Andersson in Proc. Am. Acad. Sci. IV. 55 (Sal. Bor.-Am. 9) (1858).

If this is correct the name can not be used for the combination *S. alba* × *lucida* which is represented by Bebb, Herb. Sal. no. 41, and Dudley, Sal. Cayug. no. 844. *S. alba* × *S. fragilis* × *S. lucida.* As Bebb, apud Gray, Man. ed. 6. 481 (1890), states, hybrids between *S. alba* and *S. fragilis* "are the commonest of introduced willows," and "these forms are rendered almost inextricable by a further cross, by no means rare, with our native *S. lucida.*" I do not doubt that such a cross may be met with at different localities.

S. alba × *S. lucida.* See under *S. alba Pameachiana.*

S. alba × *S. nigra.* In Gray, Man. ed. 6.481 (1890), Bebb says, that a hybrid of *S. nigra* "with *S. alba* var. *vitellina* has been found in Wayne Co., N. Y." by E. L. Hankenson. In Garden & Forest, VIII. 423, fig. 58 (1895), Bebb describes and figures this form as *S. nigra* × *alba.* I have not studied the specimens collected by Hankenson but I have some doubt as to the correctness of the interpretation. This form has been named *S. Hankensonii* by Dode in Bull. Soc. Bot. France, LV. 655, fig. D on p. 653 (1909).

S. amygdaloides × *S. longipes.* This hybrid was first observed by Glatfelter, see his notes on *Salix longipes* in Rep. Missouri Bot. Gard. IX. 49 (1898).

S. amygdaloides × *S. longipes* × *S. nigra.* See Glatfelter, l. c.

S. amygdaloides × *S. nigra.* This hybrid has been well described and figured by Glatfelter in Trans. Acad. Sci. St. Louis, VI. 427, pl. 1 (1894). I have seen plenty of material of it collected by Glatfelter and others, and I wish to propose the name × **S. Glatfelteri** for it.

S. anglorum × *S. cordifolia.* This hybrid does not apparently occur unfrequently in Labrador and in other regions where both parents meet. As I have already explained in Bot. Gaz. LXVI. 345 (1918), Rydberg's *S. Waghornei* in Bull. N. Y. Bot. Gard. I. 271 (1899), seems to represent such a hybrid so far as it can be judged by the poor type-specimen. I have seen a number of specimens which seem to be of this hybrid origin.

S. anglorum var. *araioclada* × *S. glauca* var. *glabrescens.* A specimen collected by R. A. Ware on dry talus slope near Burgess Pass, British Columbia, on August 13, 1907 (f.; G.; 18 to 40 cm. high), seems to represent such a cross. It needs, of course, further observation.

? *S. arctophila* × *S. Uva-ursi.* J. A. Allen, on August 20, 1881, collected a plant at Dead Islands, Labrador, on dry rocky ground growing with *S. Uva-ursi* (*S. Cutleri*), depressed, but a little larger than this species. The specimens bears No. 21, and may be of hybrid origin, the other parent being *S. arctophila.*

S. argyrocarpa × *S. planifolia.* This hybrid was first mentioned by Bebb apud Gray, Man. ed. 6.481 (1890), who stated under *S. argyrocarpa* that a hybrid with *S. phylicifolia* (= *S. planifolia*) had been detected by Mr. E. Faxon in Tuckerman's Ravine, White Mountains, N. H., but that leaves had already been collected by Dr. Gray as early as 1842. Faxon and Bebb described this hybrid later in 1890 in Bull. Torr.

Bot. Club. XVII, 149. I have had before me Faxon's splendid collections, and I have seen myself the plant in a living state on Mt. Washington. I take the liberty of proposing for it the name **S. Grayi**.

S. babylonica × *S. lasiandra*. This hybrid is mentioned by C. L. Anderson in Zöe I. 41 (1890), and also by Mott in Univ. Calif. Public. II. 196 (1905).

? *S. Barclayi* × *S. Scouleriana*. I have seen a specimen from Bennett, British Columbia, collected by F. A. Walpole on July 12, 1900 (No. 1082, fr. submat.; W.) which may represent such a cross.

? *S. Barrattiana* var. *Tweedyi* × *S. planifolia* var. *monica*. Like such a hybrid looks a specimen collected by A. Nelson in Wyoming, Willow Creek, May 22, 1897 (No. 2910, f.). The old female aments point to var. *Tweedyi* while otherwise the plant is hardly different from the western form of *S. planifolia*.

S. Bebbiana × *S. cordata*. Forms of such a hybrid have been distributed by F. F. Forbes, Brookline, Mass., who is an acute observer of hybrids among the American Willows, as *S. cordata* × *rostrata*.

S. Bebbiana × *S. discolor*. Of this hybrid, too, Forbes has distributed material under *S. discolor* × *rostrata*.

S. Bebbiana × *S. humilis*. This cross I know only from specimens distributed by Forbes as *S. humilis* × *rostrata*.

S. Bebbiana × *S. petiolaris*. This hybrid has also been found and distributed by Forbes as *S. petiolaris* × *rostrata*. Fernald, too, collected it in 1909 in Maine (No. 1687; G.).

S. Bebbii Gandoger, Fl. Europ. XXI. 167 (1890). This name has been used by the author for the cross *S. cordata* × *sericea*.

? *S. Bonplandiana* × *S. Gooddingii*. See Schneider in Bot. Gaz. LXV. 40 (1918).

? *G. Bonplandiana* × *S. Humboldtiana* var. *stipulacea*. See Schneider in Bot. Gaz. LXV. 40 (1918).

S. brachycarpa × *S. chlorolepis*. In Bot. Gaz. LXVI. 339 (1918), in dealing with *S. chlorolepis* I have mentioned that there are forms which must be regarded as true hybrids between these two species. I propose the name **S. gaspeensis** for this cross which is thus characterized:

A *S. chlorolepide* (et var. *antimima*) praecipue recedit filamentis basi vel ad medium plusminusve pilosis (rarius ex parte glabris), foliis ramulisque novellis densius sericeo-villosis. A *S. brachycarpae* forma in monte Albert collecta differt ramulis hornotinis foliisque adultioribus magis glabrescentibus epidermide superiore foliorum stomatibus plusminusve sparsis vel satis numerosis praedita filamentis interdum pro parte glabris.

TYPE LOCALITY: Mount Albert, Gaspé County, Quebec.

SPECIMENS EXAMINED: QUEBEC. Gaspé County: "common on the broad plateau at the top of Mt. Albert, above 1000 m.", July 26, 1881, *J. A. Allen* (type m., f.; G., W.); highest summit of same mountain, about 3150 m., July 31, 1881, same collector (f. m.; G.); on wet serpentine slopes, July 23, 1906, *Fernald & Collins* (No. 512 a, f.; G.)

S. brachycarpa × *S. pseudolapponum*. Hybrids of this origin seem to

occur rather frequently where the parents meet. See my note in Bot. Gaz. LXVI. 335 (1918).

S. candida × *S. cordata.* The first mention of this hybrid is made by Sargent in Gard. Chron. n. ser. x. 818 (1878) (see also Focke, Pflanzenmischlinge, 368 [1881]) who in a list mentions *S. candida* × *S. cordata* with the name *S. rubella* Bebb. I have not found this name rubella in any of Bebb's writings, and it is not cited by Rowlee and Wiegand in Bull. Torr. Bot. Club, XXIII. 201, pl. 276, fig. 1, 14–17 (1896) who give a good account of this hybrid. Bebb's name ought to be accepted for it. For further information see also Sheldon in Bull. Geol. Nat. Hist. Surv. Minn. IX. 585 (1896).

S. candida × *S. petiolaris.* This hybrid, too, was first mentioned so far as I know, by Sargent in Gard. Chron. n. ser. x. 818 (1878), with the name *S. Clarkei* Bebb (not *S. Clarkii* as printed l. c. and also in Focke, Pflanzenmischlinge, 368). According to Bebb's original notes published by Rowlee and Wiegand in Bull. Torr. Bot. Club, XXIII 196, the hybrid was discovered by Daniel Clarke, M. D., in 1872 in Hascoll's Swamp, near Flint, Mich. Rowlee and Wiegand give a good description of it. According to Sargent, l. c., Bebb also distinguished a var. *subpetiolaris* and a var. *subcandida* of *S. Clarkei.*

S. cinerea × *S. discolor.* Specimens taken by F. F. Forbes for this hybrid do not represent such a cross and are nothing but the European *S. nigricans* Smith according to Toepffer, in litt.

S. Clarkei Bebb see *S. candida* × *petiolaris.*

S. coactilis × *S. cordata.* See Fernald in Rhodora, VII. 203 (1907).

S. cordata × *S. discolor.* As Bebb already stated in Gray, Man. ed. 6, 482 (1890) hybrids between these two species may be met with where the parents meet.

S. cordata × *S. glaucophylloides* var. *glaucophylla.* See Toepffer, Salicet. exsicc. fasc. VIII. 298, no. 371 (1913). First distributed by Forbes in sched. as *S. cordata* × *glaucophylla.*

S. cordata × *S. incana.* This very interesting hybrid between the common east American species and the peculiar European *S. incana* Schrank was found by W. R. Dudley in 1885 and distributed by him under No. 857. See Dudley in Bull. Cornell Univ. II. 90 (1886).

S. cordata × *S. lucida.* Distributed by F. F. Forbes in 1908 and also mentioned by Knowlton and Deane in Rhodora, XVI. 108 (1914). It seems rather doubtful to me.

S. cordata × *S. monticola.* See Rydberg in Bull. Torr. Bot. Club, XXXIX 303 (1902). Rydberg regards as such a cross specimens from Utah, Big Cottonwood Canyon, below Silverlake, where there is no true *S. cordata*, and these forms need further careful observation.

S. cordata × *S. neo-Forbesii.* First mentioned by Forbes in Rhodora, XII. 10 (1909) as *S. cordata* × *subsericea.* See *S. petiolaris* × *sericea.*

S. cordata × *S. nigra.* The nonexistence of such a hybrid I have already discussed in my note XI in dealing with *S. cordata.*

S. cordata × *S. pedicellaris.* First observed by Forbes. See Toepffer, Salicet. exsicc. fasc. VIII. No. 372 (1913), and Knowlton and Deane in Rhodora, XVI. 108 (1914).

S. cordata × *S. petiolaris.* This cross has been found in several places, first by Bebb, later by Dudley and also by Forbes. See Dudley in Bull. Cornell Univ. II. 90 (1882).

S. cordata × *S. petiolaris* × *S. sericea.* See under *S. petiolaris* × *sericea.*

S. cordata × *S. sericea.* The oldest name for this hybrid seems to be *S. myricoides* Muhlenberg in Neue Schr. Ges. Naturf. Fr. Berlin, IV. 235, pl. VI. fig. 2 (1803). See also Bebb, Herb. Salic. Am. No. 12–17 (1879); apud Gray, Man. ed. 6.484 (1890), and Schneider, III. Handb. Laubh. I. 52 (1904), excl. synon. See also *S. Bebbii.*

S. cordata × *S. subsericea.* See *S. petiolaris* × *sericea.*

S. cordifolia × *S. planifolia.* Such a hybrid may be represented by A. C. Waghorne's No. 77 from Labrador, Pack's Harbor, July 28, 1892 (fr. immat.; A., C.). There is also a specimen collected by J. A. Allen in Labrador, Carrol Cave, beside a brook, August 6, 1882 (No. 13; "suberect or procumbent, about the size of 1 [*S. cordifolia*] or 6 [*S. planifolia*] nearly or quite as procumbent as 1, a little less so than 6. Outside on peaty soil, bank of a brook. Seems to come nearest 6, fruits all mixed with male flowers or abortive"), and Chateau, August 11, 1882 (No. 14; "nearly erect about 2 feet; outside; stony or gravelly sea-shore, not maritime, but at the nearest point to the shore producing plants not maritime; resembles no. 6"). If further observations should prove that this interpretation is correct or that the forms in question represent a distinct species or variety I think Allen's name should be connected with them.

S. discolor × *S. humilis.* See Töpffer, Salic. exsicc. fasc. VIII. 298 Nos. 373-4(1913), and Knowlton and Deane in Rhodora, XVI. 108 (1914).

S. discolor × *S. pyrifolia.* Fernald in Herb. Gray takes for this cross a specimen collected by him on July 22, 1909, in Maine, Washington County, Princeton, with the parents in a swampy thicket (No. 1675; st.).

? *S. Eastwoodiae* × *S. Scouleriana* (vel *S. Lemmonii*). A plant collected by A. A. Heller in Nevada, Washoe County, Divide south of Slide mountain, in granit, circ. 1500 m., July 5, 1913 (No. 10926, fr. submat.; C.) may be regarded as a hybrid of *S. Eastwoodiae* with one of the two other species.

? *S. exigua* × *S. melanopsis* var. *Bolanderiana.* See Schneider in Bot. Gaz. LXVII. 339 (1919). Besides the specimens there mentioned Heller's No. 10882, Nevada, Washoe County, log railroad north of Verdi, June 24, 1913, (fr. vix mat.; A., G.) looks much like such a hybrid.

? *S. Geyeriana* × *S. subcoerulea.* There have been collected by H. N. Patterson in Colorado, Clear Creek County, wet places near Empire in 1885 several specimens (no. 23, st.; sheet no. 107473 in C; no. 24, sheet 107805, C.; no. 27, sheet 107474, C.) and also by W. N. Suksdorf, Washington,

Spokane County, bank of Latah Creek, southeast of Spangle, May 15, July 20, 1916, (nos. 8638, 8639, f., 8640 m.; A.) which may represent forms of such a hybrid. They need, of course, further observation.

S. Geyeriana var. *meleina* × *S. sitchensis.* See J. K. Henry, Fl. S. Brit. Col. 98 (1915). I have seen one of Henry's specimens.

S. Glatfelteri Schneider. See *S. amygdaloides* × *nigra.*

S. glaucops × *S. monticola.* See Rydberg in Bull. Torr. Bot. Club, XXXIX 303 (1912). *Salix glaucops* of Rydberg is what I call *S. pseudolapponum* Von Seemen. I have not seen Garrett's no. 1671 from Utah, Big Cottonwood Canyon, Salt Lake County, August 23, 1905, which Rydberg takes for this hybrid.

? *S. Gooddingii* × *S. laevigata.* This hybrid seems to occur occasionally in California. See for instance A. A. Heller's no. 7950, Shasta County, on rocky banks of the Sacramento between Middle Creek Station and Keswicke, June 3, 1905 (fr.; A., St.; "a symmetrical shrub about ten feet high"). Needs further observation.

? *S. Gooddingii* × *S. lasiandra.* Such a hybrid may be represented by C. R. Ball's No. 1954, Calif. Univ. Farm, Davis, along Putah River, June 12, 1915 (fr.; G.; as *S. lasiandra*).

S. Grayi Schneider. See *S. argyrocarpa* × *planifolia.*

S. Hankensonii Dode. See *S. alba* × *nigra.*

S. herbacea × *S. Uva-ursi.* This is *S. Peasei* Fernald. See Schneider in Bot. Gaz. LXVII. 51 (1919).

S. humilis × *S. petiolaris.* Observed by Forbes and mentioned by Knowlton and Deane in Rhodora, XVI. 108 (1914).

S. humilis × *S. sericea.* See Rhodora, XVI. 108 (1914).

S. humilis × *S. tristis.* See Rhodora, XVI. 108 (1914).

? *S. laevigata* × *S. lasiandra.* A hybrid probably occasionally met with in California. Compare for instance A. A. Heller's No. 5329, Sonoma County, near Windsor on Russian River, April 3, 1902 (m., f.; G.), and No. 10849, Plumas County, near Marton Station, June 13, 1913 (fr.; G.).

S. longipes var. *Wardii* × *S. nigra.* See Glatfelder in Rep. Mo. Bot. Gard. IX. 49 (1898). As Ball stated the same cross is represented by Ball and Griggs, no. 64, from Washington, D. C., Canal at High Island, August 16, 1902 (st.).

S. lucida var. *intonsa* × *S. nigra.* According to Fernald in Herb. Gray his No. 1682, from New Brunswick, Westfield, Ingleside, river bank, with the parents, August 6, 1909 (fr. im.; G.) represents this hybrid. I believe that the interpretation of this excellent observer is correct.

? *S. monticola* × *S. pseudolapponum.* I am inclined to regard as such a hybrid J. G. Jack's specimens from Colorado, Pike's Peak, wagon road, about 3600 m., August 30, 1898 (fr.; A.).

S. myricoides Muhlenberg. See *S. cordata* × *sericea.*

S. neo-Forbesii Töpffer. See *S. petiolaris* × *sericea.*

S. pameachiana Barratt, Salic. Am. no. 16 (1840). See *S. alba-Pameachiana.*

S. Peasei Fernald. See *S. herbacea* × *Uva-ursi.*

S. petiolaris × *S. sericea.* Andersson's var. *subsericea* of *S. petiolaris* is now commonly regarded as representing this hybrid. In accepting this view I give the following synonymy already published by Töpffer. Some authors, however, still regard *S. subsericea* s. str. as a distinct species, and are able to distinguish hybrids between it and *S. petiolaris,* mentioned by Knowlton and Deane in Rhodora, XVI. 108 (1913).—*S. neo-Forbesii* Töpfer in Oestr. Bot. Ztschr. XLVI. 402 (1916).—*S. petiolaris* 2. *subsericea* Andersson in Svensk. Vet.-Akad. Handl. VI. 109 (1867); in De Candolle, Prodr. XVI², 234 (1868).—*S. sericea* var. *subsericea* Rydberg in Britton, Man. 318 (1901).—*S. subsericea* Schneider, Ill. Handb. Laubholzk. I. 65 (1904), non Döll, (1859); Forbes in Rhodora XI. 9 (1909).

S. petiolaris × *S. tristis.* Observed by Forbes and mentioned by Knowlton and Deane in Rhodora, XVI. 109 (1914).

? *S. planifolia* var. *monica* × *S. subcoerulea.* This cross may be represented by P. A. Rydberg's No. 6812 from Utah, Saltlake County, Big Cottonwood Canyon, below Silverlake, July 8, 1905 (fr. submat.; N.).

S. rubella Bebb. See *S. candida* × *cordata.*

S. subsericea Schneider. See *S. petiolaris* × *sericea.*

BERLIN-DAHLEM, *June,* 1921.

c. SOME REMARKS ON THE GEOGRAPHICAL DISTRIBUTION OF THE AMERICAN WILLOWS[1]

Before I conclude my notes on American Willows I wish to say a few words in regard to the geographical distribution of the different sections and species. I suppose it will be of some use to students of the genus and of the flora of a certain state or region in general to give an enumeration of all the species according to their occurrence in the different states based on the material I have been able to examine. Of some states I have seen very little material, and, therefore, my indications are far from exhaustive. I wish to draw the attention of students to the flora of those states or regions where I can give but an incomplete account of the Willows which may occur in them.

Among the twenty-three sections enumerated by me in another note there are several groups peculiar to America and not represented in the Old World; namely, Sect. Nigrae, Bonplandianae and Longifoliae. Of the Nigrae the typical *S. Humboldtiana* is restricted to South America, probably ranging as far south as the Straits of Magellan, while its northern representative, *S. nigra,* reaches the 50th degree N. Lat. in Ontario. No other section covers such a wide area, as it is also found from the Atlantic to the Pacific coast.

[1] Reprinted from Vol. II. 197–204 of this Journal with the addition of the new species and new varieties published since by C. N. Ball, except *S. caudata* var. *parvifolia* which is included under *S. lasiandra* var. *caudata.*

The species of the Longifoliae, too, are widely spread from Guatemala (*S. taxifolia microphylla*) to the vicinity of Dawson in the Yukon Valley, Yukon Territory (*S. longifolia pedicellata*), and in the States from coast to coast.

The Bonplandianae inhabit a more restricted area from Guatemala (*S. Bonplandianae* forma) to northern California (*S. laevigata*) or even southern Oregon in the west, and Illinois to the District Columbia (*S.* (*longipes Wardii*) in the east.

Other sections indigenous to Central and North America and apparently of no distinct relationship to forms of the Old Word are: Mexicanae (three species) in Mexico; Wolffianae (one species) in Idaho, Wyoming, Montana, Oregon and Colorado.

The Candidae with *S. candida* (and possibly *S. cryptodonta*) are also a section the true affinity of which is by no means clear. It is a Willow of the northern United States from New Jersey to Montana, and of Canada from Labrador to Alberta and probably to British Columbia and the Great Slave Lake in the Northwest Territories.

The Fulvae, too, with *S. Bebbiana*, *Geyeriana* and *Lemmonii* are a distinctly American group of which *S. Bebbiana* is a widely spread member from New Mexico to the Yukon Territory, and from Newfoundland and New Jersey to northeastern Nevada and Washington.

Very limited is the range of the strange Brewerianae (California), and of the Sitchenses (Pacific coast from California to Southern Alaska).

Other sections, like the Cordatae, Adenophyllae, Balsamiferae, Discolores and Griseae, including only American forms, nevertheless show a more or less distinct affinity to Asiatic and European species, while the sections Reticulatae, Ovalifoliae, Glaucae, Phylicifoliae, Chrysantheae and Roseae combine species of the Old and New World.

On the following pages I give an alphabetic enumeration of the species met with in the different states of the United States and of Canada as well as in Mexico and South America. Those species indigenous to or hitherto known only from one state or district are marked with an asterisk. A question-mark signifies that the occurrence of the species or form in the region is still doubtful or that it is not yet clearly identified.

UNITED STATES

Alabama: S. nigra, longipes var. Wardii.

Alaska: S. alaxensis and var. longistylis, * amplifolia, arbusculoides, arctica and var. obcordata, Barclayi and var. hebecarpa, Bebbiana var. prostrata, * Chamissonis, commutata, Farrae var. Walpolei, fuscescens, * glacialis, glauca var. acutifolia, * lingulata, myrtillifolia, niphoclada, ovalifolia and vars. * camdensis and * subarctica, phlebophylla, * polaris (typica?) pulchra and var. yukonensis, reticulata, * rotundifolia and f. * pilosiuscula, Richardsonii, Scouleriana, sitchensis, * stolonifera and f. * subpilosa, * venusta (doubtful).

ARIZONA: S. amygdaloides, Bebbiana var. perrostrata, Bonplandiana var. Toumeyi, exigua var. stenophylla, Geyeriana, Gooddingii, ? irrorata, laevigata and var. araquipa, lutea var. ligulifolia, monticola, pseudocordata, Scouleriana.

ARKANSAS: S. cordata, humilis, longifolia, longipes var. Wardii, nigra and var. altissima.

CALIFORNIA: S. * Breweri, cascadensis, ? commutata, * Coulteri, * delnortensis, Eastwoodiae and var. * callicoma, exigua forma, Geyeriana var. argentea, Gooddingii, Jepsonii, laevigata and var. araquipa, lasiandra and vars. lancifolia, Abramsii and caudata, lasiolepis and vars. Bigelovii and Bakeri, Lemmonii and var. Austinae, lutea and var. ligulifolia, mackenzieana, melanopsis and var. Bolanderiana, orestera, planifolia var. monica, * Parishiana, petrophila and var. caespitosa, Scouleriana and var. * crassijulis, sessilifolia vars. Hindsiana and * leucodendroides, subcoerulea.

COLORADO: S. amygdaloides pilosiuscula, Bebbiana var. perrostrata, brachycarpa, candida, exigua vars. luteosericea and stenophylla, Geyeriana and var. argentea, lasiandra and var. caudata, irrorata, lutea and var. ligulifolia, monticola, nivalis and var. saximontana, petrophila, planifolia var. monica, pseudolapponum, Scouleriana, subcoerulea, Wolfii.

CONNECTICUT: S. Bebbiana, candida, discolor, cordata, humilis, longifolia, nigra, sericea, tristis.

DELAWARE: S. cordata, discolor, humilis, longifolia, lucida, nigra, tristis.

DISTRICT COLUMBIA: S. cordata, humilis, longifolia, longipes var. Wardii, nigra, sericea, tristis.

FLORIDA: S. Harbisonii, humilis, longipes, ? nigra, tristis.

GEORGIA: S. Harbisonii, humilis, longipes, nigra.

IDAHO: S. amygdaloides f. pilosiuscula, argophylla, Bebbiana var. perrostrata, bella, brachycarpa, commutata var. puberula, exigua and vars. nevadensis and tenerrima, Geyeriana and var. argentea, lasiandra var. caudata, lasiolepis var. Bigelovii, lutea var. platyphylla, mackenzieana, melanopsis, monochroma, pseudocordata, Scouleriana, sitchensis, subcoerulea, Wolfii var. idahoensis.

ILLINOIS: S. adenophylla, amygdaloides, Bebbiana, candida, cordata, discolor, glaucophylloides var. glaucophylla, humilis, longipes var. Wardii, lucida, missouriensis, sericea, tristis.

INDIANA: S. amygdaloides, Bebbiana, candida, cordata, discolor, glaucophylloides var. glaucophylla, humilis, longifolia, longipes var. Wardii, lucida, nigra pedicellaris, petiolaris, sericea, tristis.

IOWA: S. amygdaloides, Bebbiana, candida, cordata, discolor, humilis, longifolia, lucida, missouriensis, nigra, pedicellaris, petiolaris, sericea, tristis.

KANSAS: S. amygdaloides, cordata, longifolia, longipes var. Wardii, nigra.

KENTUCKY: S. cordata, discolor, humilis, longipes var. Wardii, missouriensis, nigra, sericea, tristis.

LOUISIANA: S. longifolia, ? longipes var. venulosa, nigra var. altissima.

MAINE: S. Bebbiana, candida, * coactilis, cordata, discolor, glaucophylloides, herbacea, longifolia var. Wheeleri, lucida, nigra, pellita, petiolaris var. rosmarinoides, planifolia, sericea, Uva-ursi.

MARYLAND: S. cordata, humilis, longifolia, longipes var. Wardii, nigra, sericea, ? tristis.

MASSACHUSETTS: S. amygdaloides, Bebbiana, candida, cordata, discolor, humilis, longifolia, lucida, nigra, pedicellaris, petiolaris, sericea, serissima, tristis.

MICHIGAN: S. adenophylla, amygdaloides, Bebbiana, candida, cordata, discolor, glaucophylloides var. glaucophylla, humilis, longifolia vars. pedicellata and Wheeleri, nigra, pellita, pedicellaris, petiolaris, sericea, serissima.

MINNESOTA: S. amygdaloides, Bebbiana, candida, cordata, discolor, humilis, longifolia var. pedicellata, nigra, ? pedicellaris, petiolaris, pyrifolia.

MISSISSIPPI: S. cordata, humilis, longifolia, longipes var. Wardii, missouriensis, nigra, tristis.

MISSOURI: S. amygdaloides, cordata, discolor, humilis, longifolia, longipes var. Wardii, missouriensis, nigra, sericea, tristis.

MONTANA: S. amygdaloides, Barclayi and var. conjuncta, Barrattiana var. Tweedyi, bella, brachycarpa, candida, cascadensis, commutata, ? Drummondiana, exigua and var. tenerrima, Farrae, Geyeriana and var. meleina, lasiandra var. caudata, lutea and var. famelica, mackenzieana, melanopsis, monochroma, monticola, nivalis and var. saximontana, petrophila, planifolia var. monica, pseudocordata, pseudolapponum, pseudomonticola, Scouleriana, serissima, sitchensis, subcoerulea, vestita var. erecta, Wolfii var. idahoensis.

NEBRASKA: S. amygdaloides, Bebbiana var. perrostrata, cordata, exigua var. luteosericea, Geyeriana, humilis, longifolia, missouriensis, nigra, tristis.

NEVADA: S. amygdaloides f. pilosiuscula, Bebbiana var. perrostrata, ? commutata, Eastwoodiae and var. callicoma, exigua and var. nevadensis, Gooddingii, laevigata, lasiandra and var. caudata, lasiolepis var. Bigelovii, Lemmonii, lutea and vars. ligulifolia and platyphylla, nivalis var. saximontana, orestera, petrophila and var. caespitosa, pseudocordata, Scouleriana, subcoerulea.

NEW HAMPSHIRE: S. argyrocarpa, Bebbiana, cordata, discolor, herbacea, longifolia, lucida, nigra, planifolia, pyrifolia, ? serissima, Uva-ursi.

NEW JERSEY: S. Bebbiana, candida, cordata, discolor, humilis, longifolia, lucida, nigra, petiolaris, sericea, serissima, tristis.

NEW MEXICO: S. amygdaloides and var. Wrightii, Bebbiana var. perrostrata, ? cordata, exigua var. stenophylla, Gooddingii, irrorata, lasiandra

and var. caudata, lutea var. ligulifolia, monticola, nivalis var. saximontana, planifolia var. monica, petrophila, ? pseudolapponum, Scouleriana, subcoerulea.

NEW YORK: S. amygdaloides, Bebbiana, candida, cordata, discolor, humilis, longifolia, lucida, nigra, pedicellaris, petiolaris, pyrifolia, sericea, serissima, tristis, Uva-ursi.

NORTH CAROLINA: S. cordata, Harbisonii, humilis, longipes, nigra, sericea, tristis.

NORTH DAKOTA: S. ? Bebbiana, candida, ? cordata, humilis, longifolia, lucida, lutea and var. famelica, serissima.

OHIO: S. adenophylla, amygdaloides, Bebbiana, candida, cordata, discolor, glaucophylloides var. glaucophyllà, humilis, longifolia, lucida, nigra, petiolaris, sericea, serissima.

OKLAHOMA: S. amygdaloides, exigua var. stenophylla, longipes var. Wardii, nigra.

OREGON: S. amygdaloides f. pilosiuscula, argophylla, Barclayi var. conjuncta, Bebbiana var. perrostrata, brachycarpa, commutata and vars., ? Eastwoodiae, exigua, fluviatilis, Geyeriana and vars., Hookeriana and var. tomentosa, lasiandra and vars., lasiolepis var. Bigelovii, Lemmonii var. Austinae, lutea and var. platyphylla, mackenzieana, melanopsis, monochroma, nivalis var. saximontana, petrophila, Piperi, pseudocordata, Scouleriana, sessilifolia and var. Hindsiana, sitchensis, subcoerulea, vestita var. erecta, Wolfii var. idahoensis.

PENNSYLVANIA: S. adenophylla, Bebbiana, candida, cordata, discolor, humilis, longifolia, lucida, nigra, petiolaris, sericea, tristis.

RHODE ISLAND: S. Bebbiana, cordata, discolor, humilis, longifolia, nigra, sericea, tristis.

SOUTH CAROLINA: S. ? cordata, Harbisonii, ? humilis, longipes, nigra sericea.

SOUTH DAKOTA: S. amygdaloides, Bebbiana var. perrostrata, cordata, discolor, exigua var. luteosericea, lasiandra var. caudata, longifolia, lucida, lutea and vars. famelica and ligulifolia, nigra, Scouleriana.

TENNESSEE: S. cordata, nigra, longipes var. Wardii, tristis.

TEXAS: S. amygdaloides and var. Wrightii, ? cordata, exigua var. stenophylla, Gooddingii, humilis, ? irrorata, longifolia var. angustissima, longipes var. venulosa, nigra and vars. altissima and Lindheimeri.

UTAH: S. amygdaloides f. pilosiuscula, Bebbiana var. perrostrata, brachycarpa, exigua vars. nevadensis and ? tenerrima, Geyeriana, lasiandra var. caudata, lutea and vars. ligulifolia and platyphylla, monticola, nivalis var. saximontana, petrophila, planifolia, pseudocordata, ? pseudolapponum, Scouleriana.

VERMONT: S. amygdaloides, Bebbiana, candida, cordata, discolor, humilis, longifolia, lucida, nigra, pellita, planifolia, pyrifolia, sericea, ? serissima, Uva-ursi.

VIRGINIA: S. ? cordata, Harbisonii, humilis, longipes and var. Wardii, nigra, sericea, tristis.

WASHINGTON: S. amygdaloides f. pilosiuscula, argophylla, Barclayi and var. conjuncta, Bebbiana var. perrostrata, bella, cascadensis, commutata with its three varieties, exigua, Geyeriana var. meleina, Hookeriana, lasiandra and vars. caudata and lancifolia, mackenzieana, melanopsis, monochroma, nivalis and var. saximontana, pedicellaris, pennata, pseudocordata, Scouleriana, sessilifolia, sitchensis, subcoerulea.

WEST VIRGINIA: S. ? cordata, humilis, nigra, sericea.

WISCONSIN: S. adenophylla, amygdaloides, Bebbiana, candida, cordata, discolor, glaucophylloides var. glaucophylla, humilis, longifolia vars. pedicellata and Wheeleri, pedicellaris, nigra, ? petiolaris, serissima, tristis.

WYOMING: S. ? Barclayi, Barrattiana var. Tweedyi, brachycarpa, candida, cascadensis, * Dodgeana, exigua and vars. stenophylla and tenerrima, Geyeriana and var. argentea, lasiandra var. caudata, lutea vars. ligulifolia and platyphylla, mackenzieana, monochroma, monticola, nivalis var. saximontana, petrophila, planifolia monica, pseudocordata, pseudolapponum, Scouleriana, subcoerulea, Wolfii and var. idahoensis.

CANADA

ALBERTA: S. anglorum var. araioclada, arbusculoides, Barclayi, Barrattiana, Bebbiana, bella, brachycarpa and var. glabellicarpa, candida, commutata, Drummondiana, exigua, Farrae, glauca vars. acutifolia and glabrescens, lasiandra and var. caudata, longifolia var. pedicellata, lutea, Maccalliana, mackenzieana, melanopsis, monochroma, myrtillifolia, nivalis and var. saximontana, petiolaris var. rosmarinoides, planifolia var. monica, petrophila, pseudocordata, pseudolapponum, Scouleriana, serissima, vestita var. erecta.

BRITISH COLUMBIA: S. alaxensis, anglorum var. araioclada, arctica and var. subcordata, argophylla, Barclayi and var. conjuncta, Barrattiana, Bebbiana var. perrostrata, candida, commutata, ? Drummondiana, exigua, Farrae, Geyeriana var. meleina, glauca vars. acutifolia and glabrescens, Hookeriana, lasiandra and vars., Maccalliana, mackenzieana, melanopsis, monochroma, nivalis and var. saximontana, ? petiolaris var. rosmarinoides, petrophila, ? prolixa, pseudocordata, ? pyrifolia, pulchra, Richardsonii, Scouleriana, sessilifolia, sitchensis, vestita var. erecta, and spec. coll. Eastwood.

LABRADOR: S. adenophylla, anglorum, arctophila, argyrocarpa, calcicola, candida, ? cordata, cordifolia and vars. atra, hypoprionota and Macounii, herbacea, laurentiana, myrtillifolia, pellita, planifolia, pyrifolia, vestita, Uva-ursi.

MANITOBA: S. adenophylla, amygdaloides, Bebbiana, brachycarpa, calcicola, candida, ? cordata, discolor, longifolia var. pedicellata, lucida, Maccalliana, petiolaris var. rosmarinoides, ? planifolia, pyrifolia, serissima.

NEW BRUNSWICK: S. Bebbiana, candida, cordata, discolor, lucida, nigra, pellita, petiolaris, pyrifolia, sericea.

NEWFOUNDLAND: S. anglorum var. kophophylla, Bebbiana and var.

* projecta, calcicola, candida, ? cordata, cordifolia and var. Macounii, discolor, glaucophylloides, * leiolepis, lucida, myrtillifolia var. brachypoda, pellita, pyrifolia, reticulata, Uva-ursi, vestita.

NOVA SCOTIA: S. Bebbiana, ? cordata, discolor, lucida, pyrifolia.

NORTHWEST TERRITORIES: S. adenophylla, alaxensis, anglorum, arbusculoides, arctophila, Bebbiana and var. perrostrata, brachycarpa, candida, chlorolepis, cordifolia, * desertorum, * fullertonensis, glauca var. acutifolia, herbacea, * hudsonensis, longifolia var. pedicellata, mackenzieana, myrtillifolia, niphoclada, ? planifolia, pyrifolia, reticulata, Richardsonii, Uva-ursi, vestita.

ONTARIO: S. adenophylla, amygdaloides, Bebbiana, calcicola, cordata, discolor, humilis, glaucophylloides var. glaucophylla, humilis, Maccalliana, myrtillifolia, nigra, pellita, petiolaris and var. rosmarinoides, pyrifolia, serissima.

QUEBEC: S. adenophylla, amygdaloides, anglorum vars. * antiplasta, araioclada and kophophylla, arctophila, argyrocarpa, Bebbiana, calcicola, candida and var. denudata, chlorolepis and var. * antimima, cordata, cordifolia and vars., discolor, fuscescens var. hebecarpa, glaucophylloides, herbacea, * laurentiana, longifolia var. pedicellata, lucida, myrtillifolia, nigra, * obtusata, * paraleuca, pellita, petiolaris var. rosmarinoides, planifolia, pyrifolia, reticulata, serissima, Uva-ursi, vestita.

SASKATCHEWAN: S. Bebbiana, brachycarpa, candida, ? cordata, discolor, longifolia var. pedicellata, lutea, Maccalliana, myrtillifolia, petiolaris, rosmarinoides, pyrifolia, Scouleriana, serissima.

YUKON TERRITORY: S. alaxensis and var. * longistylis, arbusculoides, ? anglorum, arctica, Bebbiana var. perrostrata, glauca var. acutifolia, lasiandra and var. lancifolia, longifolia var. pedicellata, myrtillifolia, pulchra and var. yukonensis, reticulata, Richardsonii, Scouleriana, and spec. coll. Eastwood.

WESTERN GREENLAND: S. * anamesa, anglorum, arctophila, cordifolia, glauca var. ovalifolia, herbacea, Uva-ursi.

CENTRAL AMERICA

CUBA: S. longipes.

GUATEMALA: S. Bonplandiana forma, Humboldtiana var. stipulacea.

MEXICO: S. amygdaloides var. Wrightii, Bonplandiana and vars., * cana, * Endlichii, exigua var. stenophylla, Gooddingii, * Hartwegii, Humboldtiana var. stipulacea, * jaliscana, lasiolepis, longifolia var. angustissima, * mexicana, nigra var. Lindheimeri, * oxylepis, * paradoxa and var. * ajuscana, * Rowleei and var. * cana, * Schaffneri, taxifolia and var. * microphylla.

SOUTH AMERICA: S. Humboldtiana and var. * Martiana.

d. ANALYTICAL KEYS TO THE SPECIES OF AMERICAN WILLOWS

In the following keys an attempt has been made to facilitate the determination of incomplete material, that is, of specimens of one sex or with leaves only. To accomplish this three different keys are necessary one for specimens with staminate flowers, one for specimens with pistillate flowers, and one for specimens with mature leaves. Some species, however, do not appear in each of the three keys, as the staminate flowers of several species are still unknown, while of two species the pistilate flowers are unknown. In the key for staminate specimens it has not always been possible to find sufficient differences in the flowers of some closely related species to make their determination without leaves possible. The key for the leaf specimens has presented ever greater difficulties, as the leaves of Salix are of a comparatively uniform character and within many species are variable in size, serration and pubescence. It must therefore be stated that this key allows in many cases only an approximate determination if the corresponding flowers are not at hand and the determinations arrived at must be used with caution, unless they can be verified by comparison with correctly determined material.

The number prefixed to the species apply to their sequence in the systematic enumeration of all American species which will appear in the next issue of this Journal together with a complete index which will conclude this series of Notes on American Willows.

I. CLAVIS SPECIERUM SECUNDUM SPECIMINA MASCULA[1]

(Specimina feminea, vide p. *97*, sterilia, vide p. *107*)

A. **Flores glandulis duobus (ventrali et dorsali) instructi** (B, vide p. *94*.)

a. Stamina 3 v. plura (b, vide p. *92*)

Amenta coetanea vel serotina, fere semper pedunculo distincto foliolato instructa, nunquam normaliter in axillis foliorum maturorum in autumno vel mense Februario apparentia.

*Amenta satis evoluta vix ultra 8–10 mm. crassa, elongato-cylindrica, saepe flexuosa, pleraque ultra 6-plo longiora quam crassa; filamenta saepissime subcurvata non stricta.

Ramuli floriferi rubro-fusci ad purpurascentes.

Foliola pedunculorum utrinque concoloria et stomatifera; bracteae plusminusve lanceolatae et acutiusculae; ramuli fragiles, floriferi satis intense fusci vel purpurascentes. 1. *S. Humboldtiana* 2. *S. nigra.*

Foliola pedunculorum subtus (initio saepe indistincte) pallidiora, estomatifera (vel in *S. Harbisonii* stomatibus paucis instructa); bracteae plusminusve latiores obtusioresque; ramuli (*S. Harbisonii* excepta) tenaces.

Ramuli fragiles; folia superne stomatibus paucis instructa; bracteae subacutiores. . . . . 12. *S. Harbisonii.*

Ramuli tenaces, floriferi saepissime satis sordide vel obscure brunnescentes vel subcinerascentes.

Amenta normaliter ultra 4 cm. longa, foliolis pedunculorum satis longiora. . . . . 10. *S. laevigata* et 11. *S. longipes*

[1] Of the following species the male plant is still unknown: *S. cryptodonta, S. Drummondiana, S. glacialis, S. latiuscula, S. laurentiana, S. Nelsonii, S. obtusata, S. paraleuca, S. pellita, S. Schaffneri.*

Amenta ut videtur vix ultra 3.5 cm. longa et 8 mm. crassa, foliolis pedunculorum subaequilonga; ramuli floriferi saepissime plusminusve tomentosuli . . . . . 8. *S. jaliscana.*

Ramuli floriferi flavescentes, flavo-olivacei, viridi-flavescentes vel sordide cinereo-brunnescentes; ramuli fragiles.

Foliola pedunculorum utrinque concoloria et stomatifera, lineari-lanceolata. . . . . 3. *S. Gooddingii.*

Foliola pedunculorum subtus discoloria, superne vix stomatifera, magis ovato-lanceolata . . . . . 4. *S. amygdaloides.*

**Amenta satis evoluta 10–13 mm. crassa, ovato- vel elliptico-cylindrica, satis stricta, pleraque tantum 2–4(–5)-plo longiora quam crassa, filamenta saepe stricta; ramuli saepissime nitiduli.

Ramuli floriferi plusminusve rubro-brunnei vel purpurascentes. 6. *S. lasiandra.*

Ramuli floriferi plusminusve flavo- vel olivaceo-brunnei vel olivaceo-fusci.

Foliola pedunculorum utrinque concoloria; amenta 2.5–4 cm. longa. 7. *S. lucida.*

Foliola pedunculorum subtus discoloria; amenta vix ultra 1.5 cm. longa. 5. *S. serissima.*

Amenta serotina, autumno (vel in mense Februario) in axillis foliorum normalium apparentia, 4–6 cm. (in var. *Toumeyi* vix ultra 3 cm.) longa; folia subtus discoloria . . . . . 9. *S. Bonplandiana.*

b. STAMINA TANTUM 2 (VEL IN *S. Uva-ursi* TANTUM 1)

1. *Filamenta basi vel ad medium dense longe villosa; bracteae flavescentes; folia utrinque fere aequaliter stomatifera*

Amenta tantum 5–13(–18) mm. longa et circ. 8 mm. crassa; antherae minimae plusminusve globosae vel subglobosae; folia minima vel parva, linearia vel lineari-lanceolata, vix ultra 30:3.5 mm. magna . . . . . 13. *S. taxifolia.*

Amenta longiora vel antherae ellipticae vel folia majora (confer clavem in Bot. Gaz. LXVII, 312. Vide species sequentes: 14. *S. sessilifolia*, 15. *S. fluviatilis* 16. *S. Parishiana*, 17. *S. argophylla*, 18. *S. exigua*, 19. *S. melanopsis* et 20. *S. longifolia.*[1]

2. *Filamenta basi breviter et laxius villosula vel glaberrima; bracteae flavescentes vel fuscescentes; folia superne haud vel satis sparse stomatifera.*

Filamenta plusminusve pilosa (interdum ima basi tantum pilis paucis instructa); bracteae concolores, flavescentes vel violaceae.

Amenta serotina, pseudoterminalia, anguste cylindrica vel minima pauciflora, pedunculis nudis iis saepe subaequilongis suffulta; glandulae 2 vel interdum plures pseudodiscum lobulatum formantes.

Bracteae intus plusminusve brevi-pilosae vel utrinque sericeae; folia coriacea, superne conspicue inciso-reticulata.

Antherae violaceae; bracteae intus tantum brevipilosae; frutex prostratus; petioli elongati ad 3 cm. longi . . . . . 21. *S. reticulata.*

Antherae flavae; bracteae utrinque plusminusve sericeae; frutex prostratus vel erectus; petioli breves gemmis vix longiores. 22. *S. vestita.*

Bracteae glabrae vel tantum parce ciliatae; folia tenuiora, superne vix inciso-reticulata; frutices prostrati, interdum minimi, suffruticulosi. 24. *S. nivalis.*

Amenta coetanea, rarius serotina, lateralia, ovata vel cylindrica, semper multiflora sed interdum parva, pedunculis semper foliolatis.

Antherae minimae ellipsoideo-globosae; amenta sub anthesi subglobosa vel ellipsoidea, 5: 5 ad 10: 8 mm. magna . . . . . 41. *S. brachycarpa.*

Antherae magis ellipsoideae, longiores; amenta saepissime ultra 10–15 mm. longa et crassiora (confer clavem in Bot. Gaz. LXVII, 43).[2] Vide species sequentes 47. *S. cordifolia*, 43. *S. desertorum*, 46. *S. glaucae* varietates, 45. *S. Maccalliana*, 44. *S. pseudolapponum* et etiam species satis incerte cognitae 42. *S. niphoclada* et 49. *S. lingulata.*

[1] I am not able to give a key for the male specimens of these species. The species of Sect. *Longifoliae* need a much closer study in the field.

[2] With our present knowledge it is almost impossible to determine these species from male specimens only.

Filamenta omnino glabra.
Stamen unicum; folia adulta discoloria, glabra; frutex depressus vel prostratus. 26. *S. Uva-ursi.*
Stamina semper 2.
Folia utrinque concoloria vel subconcoloria, etiam superne stomatifera minima vel parva, rarius ultra 25 mm. longa latave; amenta serotina tenuia, pauci-(rarius multi-)flora; fruticuli minimi, saepe suffruticulosi, ramulis tenuissimis, fere semper radicantibus.
Bracteae concolores, flavescentes vel violascentes, glabrae vel apice tantum parce ciliatae; folia adulta sicca nunquam persistentia.
Folia utrinque obtusa vel acutiuscula, integra, non reticulata. 30. *S. Dodgeana.*
Folia utrinque rotundata, basi saepe cordata, crenato-serrata, reticulata. 27. *S. herbacea.*
Bracteae bicolores, apice plusminusve purpurascentes, distincte ciliatae vel etiam facie parce pilosae; folia adulta sicca per secundum annum persistentia, integerrima.[1]
Amenta minima, 3–8-flora; folia orbicularia vel late ovalia, adulta sicca anno secundo decidua . . . . . 28. *S. rotundifolia.*
Amenta multiflora, ad 23 mm. longa; folia adulta per plures annos persistentia, elliptica vel lineari-lanceolata . . . 29. *S. phlebophylla.*
Folia subtus discoloria vel bracteae bicolores et longe sericeae; fruticuli vel frutices.
Bracteae bicolores, apice vel pro parte maxima fuscae vel brunneae, versus apicem longe sericeae (pilis sericeis bractea vix vel paullo brevioribus), interdum apice tantum longe ciliatae.
Amenta coetanea vel saepe serotina et in apice pedunculi foliiferi vel ramuli brevis lateralis; fruticuli vel frutices parvi, ramis prostratis radicantibus vel subterraneis, floriferis tantum adscendentibus vix ad 15–20 cm. altis (in formis *S. arcticae* interdum altioribus). (Confer clavem in Bot. Gaz. LXVII, 39–41). Vide species sequentes 33. *S. anglorum*, 34. *S. arctica*, 37. *S. arctophila*, 35. *S. ovalifolia*, 32. *S. petrophila* et 36. *S. stolonifera.*[2]
Amenta praecocia, sessilia vel subsessilia, vel coetanea sed lateralia; frutices erecti ramis strictis.
Antherae violaceae, minimae, globosae; amenta parva, pedunculo brevi excluso vix ultra 1.5: 0.7 cm. magna; foliola subtus dense adpresse sericea . . . . . 114. *S. argyrocarpa*
Antherae flavae, magis ellipsoideae.
Amenta coetanea pedunculo excluso vix ad 12(–18): 8 mm. magna; folia foliolaque integerrima, rarius infima tenuiter denticulata. 50. *S. Wolfii.*
Amenta autumno in axillis foliorum normalium apparentia vel primo vere praecocia, sessilia subsessiliaque, ad 8.8 : 0.7–0.8 cm. magna.
Ramuli floriferi tomentosi . . . . . 51. *S. Hartwegii.*
Ramuli floriferi glabri . . . . . 52. *S. mexicana*
Bracteae concolores, flavescentes et fere glabrae vel stramineae flavo-brunnescentesve et breviter sericeo-villosae (pilis bractea brevioribus) vel subdiscolores sed tantum villosae vel pilis sericeis tenuissime praeditae; frutices prostrati vel saepe erecti, 0.3 ad 1, rariter ad 2 m. alti.
Amenta minima vel parva, 5–10 mm. longa vel in *S. niphoclada* ad 22: 4 mm. magna et laxiflora; petioli vix ultra 2 mm. longi.
Bracteae subglabrae vel extus dense pilosae; folia superne stomatifera . . . . . 40. *S. chlorolepis.*
Bracteae utrinque pilis satis brevibus sericeo-pilosae; folia superne haud stomatifera . . . . . 42. *S. niphoclada.*

[1] See also 25. *S. polaris* et 31. *S. cascadensis* in which the dorsal gland seems to be always or mostly absent.
[2] I am not able to give a reliable key to distinguish the male plants of these species, and I refer to the statements given l. c.

Amenta 1.2–3.5 cm. longa et ultra 5 mm. crassa; petioli saepissime ultra 2 mm. longi. Vide formas diversas sub 48. *S. anamesa,* 47. *S. cordifolia* et 46. *S. glauca* enumeratas.

B. **Flores glandula tantum unica (ventrali) instructi.**

a. STAMEN UNICUM

Antherae violaceae; bracteae florum plusminusve distincte fuscescentes. 111. *S. sitchensis.*

Antherae aureae; bracteae florum flavescentes vel ad apicem flavo-brunneae. 112. *S. Coulteri.*

b. STAMINA SEMPER 2, FILAMENTIS INTERDUM PRO PARTE COALITIS

1. *Filamenta basi plusminusve (interdum tantum parce) pilosa*

Bracteae florum flavae vel flavobrunneae vel interdum ad apicem satis rubro-brunnescentes, satis breviter pilosae (pilis etiam ad apicem quam bractea brevioribus).[1])

Ramuli floriferi pruinosi vel amenta plusminusve coetanea et folia novella pilis etiam fulvis praedita . . . . . 85. *S. Geyeriana.*

Ramuli floriferi epruinosi: amenta plusminusve praecocia; folia novella tantum argenteo- vel griseo-pilosa . . . . . 84. *S. Bebbiana.*

Bracteae florum distincte bicolores, apice vel pro parte maxima fuscae, praesertim ad apicem pilis bracteam aequilongis vel ea longioribus sericeis instructae.[2]

Amenta coetanea vel satis serotina, pedunculis foliola normalia 2–5 gerentibus suffulta, satis tenuia, vix ultra 1 cm. crassa.[3]

Foliola pedunculorum semper margine dense minime glanduloso-denticulata. 70. *S. Eastwoodiae.*

Foliola pedunculorum haud vel tantum versus basim sparse glanduloso-denticulata . . . . . 86. *S. Lemmonii.* 71. *S. orestera.*

Amenta praecocia, sessilia vels ubsessilia, basi normaliter foliolis tantum squamiformibus parvis paucis suffulta.[4]

Amenta satis tenuia, anguste cylindrica, vix ad 1 cm. crassa. 90. *S. petiolaris.* 92. *S. sericea.*

Amenta satis crassa, saepe ovoideo- vel ellipsoideo-cylindrica, 1–1.5 cm. crassa.

Ramuli floriferi leviter pruinosi . . . . 86. *S. Lemmonii* var. *Austinae.*

Ramuli nunquam pruinosi. Confer 95. *S. discolorem* et 96. *S. Scoulerianam* et species mexicanas 97. *S. paradoxam* et 98. *S. oxylepidem.*

2. *Filamenta semper omnino glaberrima.*[5]

Folia subtus discoloria.

Folia circumcirca dense et minute glanduloso-serrata. . 63. *S. Chamissonis.*

Folia integerrima vel versus basim tantum sparse denticulata. 89. *S. fuscescens.*

[1] Of the very rare Californian 109. *S. Breweri* the bracts are also yellowish but their pubescence consists of long thin sericeous hairs and the gland is remarkably slender and more than half as long as the bract.

[2] The very little known Mexican 115. *S. cana* has fuscous bracts with a very short pubescence, small coetaneous ellipsoidal aments, more or less tomentose branches and linear-lanceolate leaves. Of the apparently very closely related 116. *S. Endlichii* with glabrous branchlets I have not yet seen material. The male plant of 91. *S. coactilis* from Maine is still very little known; it seems to have violet anthers.

[3] Of 77. *S. amplifolia* the filaments are sometimes slightly pilose at base. This species has large aments measuring up to 6.5: 1.7 cm.

[4] Of the rare 103. *S. pennata* from Washington and Oregon the filaments possess only very few hairs at their base. Sometimes also the filaments of 9. *S. Piperi* show a few hairs. Both have glabrous purpurascent rather shining flowering branches.

[5] The determination of the male plants of the following species is often a very difficult task owing partly to the precociousness of the aments and the great similarity as a whole of the male flowers. It mostly needs a careful comparison of a well-collected series of flowering specimens of each species to thoroughly establish the differences between them without the aid of the leaves.

Folia utrinque concoloria vel subtus paullo pallidiora et anni praeteriti plusminusve persistentia.
Ramuli floriferi saepissime 2-foliati; folia utrinque viridia, adulta sicca haud persistentia . . . . . 25. *S. polaris.*
Ramuli floriferi plurifoliati; subtus folia paullo pallidiora, adulta sicca anno secundo plusminusve persistentia . . . . . 31. *S. cascadensis.*

α. Plantae prostratae ramulis repentibus; amenta coetanea vel serotina; antherae ut videtur violaceae.

Folia subtus discoloria.
Folia circumcirca dense et minute glanduloso-serata . . 64. *S. Chamissonis.*
Folia integerrima vel versus basim tantum sparse denticulata. 89. *S. fuscescens.*
Folia utrinque concoloria vel subtus paullo pallidiora et anni praeteriti plusminusve persistentia.
Ramuli floriferi saepissime 2-foliati; folia utrinque viridia, adulta sicca haud persistentia . . . . . 25. *S. polaris.*
Ramuli floriferi plurifoliati; folia subtus paullo pallidiora, adulto sicca anno secundo plusminusve persistentia . . . . . , . . 31. *S. cascadensis.*

β. Plantae erectae rariter subprostratae sed ramis strictis nunquam repentibus.

o. Stipulae foliorum anni praeteriti pro parte persistentes;; amenta praecocia sessilia.

Ramuli floriferi castanei vel purpurascentes, plus minusve nitiduli, juveniles tantum interdum tomentosi; stipulae lineares denticulatae; antherae probabiliter semper purpureae . . . . . 100. *S. pulchra.*
Ramuli floriferi plusminusve, juveniles densius subhirsuto-villosi vel villosi; stipulae lanceolatae vel cordatae, intus plusminusve glandulosae; antherae flavae.
Stipulae lanceolatae, acuminatae, saepe lobulato-denticulatae; ramuli etam vetustiores dense subhirsuto-villosi . . . . . 74. *S. Richardsonii.*
Stipulae semiovatae ad semiorbiculatae, margine dense glanduliferae (confer etiam 75. *S. calcicolam*); ramuli floriferi vetustioresque plusminusve glabrescentes vel glabri . . . . . 76. *S. Barrattiana.*

oo Stipulae nullae vel nunquam persistentes.

* Antherae juveniles distincte violaceae vel purpureae.[1]

Bracteae florum dense longe pulchre sericeae; amenta magna, 3–5 cm. longa et 1.5–1.8 cm. crassa; ramuli floriferi interdum pruinosi, praesertim annotini tomento densissimo albo obtecti . . . . . 81. *S. alaxensis.*
Bracteae florum satis breviter sericeo-villosae; amenta minora vel pubescentia ramulorum diversa.
Amenta ellipsoidea vel cylindrica, 0.8–2–4 : 0.8–1 cm. magna.
Ramuli praesertim novelli tomento pseudofarinaceo floccoso-albescenti vel canescenti obtecti; amenta plus minusve ellipsoideo-cylindrica, ad 2: 1 cm. magna, plusminusve sessilia . . . . . 82. *S. candida.*
Ramuli glabri nitiduli; amenta anguste cylindrica, ad 4:1 cm. magna, breviter pedunculata . . . . . 113. *S. arbusculoides.*
Amenta subglobosa, 5–12 : 7–8 mm. magna; ramuli breviter cano-tomentelli. 94. *S. tristis.*

** Antherae juveniles flavae (interdum partim paullo rubescentes).

= Ramuli floriferi juvenilesque plusminusve pruinosi, glabri; amenta praecocia, sessilia vel subsessilia.

Filamenta pleraque basi vel fere ad medium coalita . . . . 54. *S. irrorata.*
Filamenta libera (etiam in *S. pulchra* var. *yukonensi* et in *S. alaxensi* var. *longi-*

[1] In herbarium specimens it is often rather difficult to ascertain clearly the color of the anthers, because old anthers of other species usually become blackish in drying. Sometimes the very young anthers may be somewhat purplish, at least at the apex, while later they normally are yellow or golden. Probably the young anthers of *S. argyrocarpa*, *S. humilis*, *S. pedicellaris*, and of the very rare Californian *S. delnortensis* are more or less purpurascent too.

styli ramuli paullo vel satis pruinosi sunt). Confer 106. *S. bellam*, 104. *S. pellitam*, 102. *S. planifoliam* et 105. *S. subcoeruleam*.[1]

= = Ramuli nunquam pruinosi.

Bracteae concolores, flavescentes, partim ad apicem rubescentes; glandula linearis, quam bractea paullo brevior; amenta anguste cylindrica, sessilia vel subsessilia; species rara californica . . . . . 109. *S. Breweri.*

Bracteae bicolores, ad apicem vel omnino fuscescentes vel brunnescentes (in *S. commutata* satis flavo-brunneae); glandula vix distincte linearis, quam bractea saepissime plus quam duplo brevior.

Amenta sessilia vel subsessilia, praecocia vel subcoetanea, basi subnuda vel tantum foliolis parvis squamiformibus instructa.[2]

Pubescentia bractearum florum sericea pilis satis strictis superioribus quam bractea vix brevioribus.

Ramuli etiam novelli tantum sparse pilosi vel ab initio glabri; filamenta interdum paullo coalita.[3]

Bracteae satis late obovatae; folia superne estomatifera; stipulae saepissime nullae. (Confer etiam 96. *S. Scoulerianae* formas glabras). 79. *S. Piperi.*

Bracteae satis oblongae, obtusae vel subobtusae; folia superne stomatifera; stipulae saepissime distinctae. . . . . 66. *S. monticola.*

Ramuli praesertim hornotini tomentosi vel villoso-tomentosi; filamenta normaliter libera.

Amenta ad apicem ramulorum brevium lateralium 1–2 pseudoterminalia . . . . . 75. *S. calcicola.*

Amenta in ramulis elongatis plura lateralia.

Antherae initio (an semper?) violaceae; amenta vix ultra 2 : 1.2 cm. magna; ramuli floriferi vix plus quam 2(–2.5) mm. crassi. 93. *S. humilis.*

Antherae etiam initio semper flavae vel aureae; amenta saepissime longiora vel crassiora; ramuli floriferi plerique (2.5–) 3–4.5 mm. crassi. Confer 78. *S. Hookerianam*, 99. *S. Rowleei* et 96. *S. Scoulerianae* formas.

Pubescentia bractearum florum crispo-sericea pilis partim vel omnibus plusminusve crispis vel etiam superioribus quam bractea vix longioribus.[4]

Ramuli floriferi lutescentes vel flavescentes (saepe partim rubescentes); amenta 2–3.5(–4) cm. : 8–10 mm. magna, subsessilia, basi bracteolata vel foliis minimis 2–3 integris vel minute denticulatis suffulta; bracteae oblongae, acutiusculae, satis longe laxe sericeae . . . . 60. *S. lutea.*

Ramuli floriferi fusci, brunnescentes vel castanei, interdum pubescentes vel tomentosi.

Bracteae obovatae, apice plusminusve rotundatae obtusaeve, extus saltem dense albo-sericeae (pilis saepe satis brevibus); amenta 2–4: 0.8–1 cm. magna (in var. *Bigelovii* ad 6:1.2 cm.), praecocia, sessilia basi bracteolis paucis minutis dense sericeis deciduis obsita. 55. *S. lasiolepis.*

Bracteae vix obovatae, oblongiores, acutiores vel glabriores vel amenta basi foliolis paucis suffulta.

[1] See the key given in this Jour. I. 69.
It is almost impossible to distinguish male specimens of these species without the aid of the leaves.

[2] It sometimes happens that species of which the aments mostly are precocious may develop a distinct peduncle with small leaves. On the other hand, species like for instance *S. glaucophylloides* or *S. pyrifolia*, not unfrequently bear rather precocious male aments with only a few small bracts at their base.

[3] See also the species mentioned above *S. bella*, *S. pellita*, *S. planifolia* and *S. subcoerulea* of which the flowering branchlets sometimes are hardly pruinose, but the filaments are always free.

[4] This refers to the species of section *Cordatae* of which the bracts sometimes are subglabrous, but mostly their hairs are somewhat curled, a feature that gives to the whole appearance of the pubescence of the aments a rather peculiar character.

Ramuli floriferi crassi distincte pubescentes vel tomentosi; amenta 4–6.5 : 1–1.3 cm. magna, sessilia, basi bracteolis paucis lanceolatis laxe pilosis minute denticulatis obsita . . . . 58. *S. missouriensis.*

Ramuli floriferi glabri vel amenta minora. Confer species sequentes: 56. *S. ligulifolia,* 56. *S. cordata,* 59. *S. mackenzieana,* 61. *S. monochroma,* 63. *S. pseudocordata,* et 62. *S. myrtillifolia.*

Amenta pedunculo distincto foliolato suffulta, coetanea vel satis serotina. (Confer etiam species Sect. *Cordatae*).

Ramuli floriferi plusminusve et praesertim novelli satis dense tomentosi vel villosi.

Foliola pedunculorum circumcirca dense minute glanduloso-serrata vel denticulata . . . . . 68. *S. adenophylla.*

Foliola pedunculorum integerrima vel tantum parce (in *S. commutata* interdum densius) denticulata.

Bracteae oblongo-lanceolatae, satis flavo-brunneae; folia utrinque concoloria et stomatifera . . . . . 69. *S. commutata*

Bracteae obovales vel obovato-oblongae, supra medium fuscae; folia subtus discoloria, superne haud stomatifera.

Pedunculi distincte foliolati, ad 2 cm. longi; foliola ut videtur semper integerrima (species rara alaskana) . . . . . 77. *S. amplifolia.*

Pedunculi subnulli vel foliola parva margine plusminusve glanduloso-denticulata. Confer 65. *S. Barclayi* et 78. *S. Hookerianam.*

Ramuli floriferi (et saepissime etiam novelli) glabri.

Foliola pedunculorum circumcirca satis dense minute glanduloso-denticulata; glandula brevis, crassa, fere quadrato-globosa; bracteae satis brunneae vel apice rubescentes. . . . . 72. *S. pyrifolia.*

Foliola pedunculorum integerrima vel sparse denticulata et glandula saepissime magis elongata.

Amenta parva pedunculo excluso vix ad 1.5:0.7 cm. magna; foliola foliaque novella subtus dense adpresse sericea; antherae minimae, globosae, ? violaceae . . . . . 114. *S. argyrocarpa.*

Amenta majora; foliola foliaque plusminusve glabra vel antherae diversae.

Folia novella (et saepe matura) laxe vel densius (praesertim superne) pubescentia (Confer etiam 78b. *S. Hookerianam* var. *laurifoliam*). 65. *S. Barclayi.*

Folia etiam novella glaberrima vel citissime glabra, interdum subtus ad costam pilosula.

Bracteae satis dense sericeae; antherae distincte flavae; amenta densiflora tantum foliolis parvis plusminusve denticulatis suffulta 68. *S. glaucophylloides.*

Bracteae saepissime tantum parce sericeae; antherae (?an semper) purpureae; amenta laxiflora foliolis quam folia paullo minoribus integerrimis suffulta . . . . . 87. *S. pedicellaris*

II. CLAVIS SPECIERUM SECUNDUM SPECIMINA FEMINEA.[1]

A. Bracteae florum stramineae et sub fructi non persistentes (B, vide p. 99)

a. Flores glandulis duobus (ventrali et dorsali) instructi

Amenta serotina, pedunculis satis normaliter foliatis suffulta; folia glabra (forma rara brasiliensis) . . . . . 1c. *S. Humboldtiana* var. *Martiana*

Amenta coetanea satis breviter pedunculata; folia utrinque adpresse sericea (forma rara e Nevada et California) . . . . . 18c. *S. exigua* var. *nevadensis.*

b. Flores normaliter glandula unica ventrali instructi.[2]

Amenta saepissime serotina,[3] *interdum in eodem pedunculo vel ramulo laterali*

[1] Of the Mexican species 115. *S. cana* and 98. *S. oxylepis* the female plants are still unknown.

[2] As I have pointed out in Bot. Gaz. LXV, 15 (1918) the glands of the species of Sect. *Bonplandianae* as well of some of Sect. *Pentandrae* subsect. *Lucidae* sometimes have a somewhat cup-shaped ventral gland but the dorsal gland is usually wanting.

[3] Under certain climatic conditions the aments may develop rather suddenly with

ad 2-3 apparentia; ovaria sessilia vel pedicello glandulam oblongam haud ultra duplo superante stipitata; stigmata sessilia vel styli brevissimi stigmatibus elongatis breviores; folia utrinque concoloria (S. melanopsi excepta), brevipetiolata stipulae saepissime nullae (Species sect. *Longifoliae*).

Amenta brevia satis pauciflora, etiam fructifera haud ultra 2:1, 2 cm. magna; stigmatum lobi lineares vel lineari-lanceolati; folia minima vel parva, 10–30: 1.5–3.5 mm. magna . . . . . 13. *S. taxifolia.*

Amenta longiora vel folia majora vel stigmatum lobi breves elliptici.

Stigmatum lobi lineares vel lineari-lanceolati, 4–5-plo longiores quam crassi, adulti saepissime plusminusve revoluti. (Vide clavem in Bot. Gaz. LXVII, 312). Confer species sequentes 15. *S. fluviatilis,* 16. *S. Parishiana,* 14. *S. sessilifolia* et 20a *S. longifolia* f. Wheeleri.

Stigmatum lobi lanceolati vel elliptici, satis breves, saepissime 2–3-plo longiores quam lati, adulti nunquam distincte revoluti.

Ovaria etiam juvenilia glaberrima.

Folia matura subtus plusminusve pallidiora vel glaucescentia. 19. *S. melanopsis.*

Folia subtus concoloria. Confer 18c. *S. exiguam* var. *tenerrimam,* 20b. *S. longifoliam* var. *pedicellatam* et 18c. *S. exiguam* var. *stenophyllam.*

Ovaria semper distincte sed interdum tantum pro parte sericeo-villosa vel sericea; fructus interdum fere glabrescentes. Confer 17. *S. argophyllam,* 18. *S. exiguam* et 20. *S. longifoliam.*

2. *Amenta coetanea vel interdum serotina, fructifera pedunculo saepe elongato normaliter foliato suffulta, sed semper singula; ovaria saepissime pedicello distincto (interdum glandulam ad 6-plo superante) stipitata; stigmata brevia pleraque stylo brevi sed distincto suffulta; folia dense serrato-dentata vel subtus discoloria et satis longe petiolata; stipulae saepissime satis evolutae.*

Folia foliolaque pedunculorum utrinque viridia et aequaliter stomatifera, infimis saepe exceptis linearia, lineari-lanceolata vel lanceolata, normalia satis dense glanduloso-denticulata; ramuli fragilissimi (Species sect. *Nigrae*).

Ramuli floriferi plusminusve fuscescentes vel purpurascentes; ovaria pedicellique semper glabri.

Fructus perfecte maturi ovoidei vel ovoideo-oblongi, apice vix vel tantum breviter attenuati, pedicello brevi iis plerumque 4–5plo breviore glandulam circiter duplo superante suffulti. . . . . 1. *S. Humboldtiana.*

Fructus perfecte maturi ovoideo-subrostrati, apice satis attenuati, pedicello satis variabili glandula 2–5-plo longiore suffulti . . . . . 2. *S. nigra.*

Ramuli floriferi plusminusve distincte flavescentes vel flavo-cinerei; ovaria fructusque vel tantum pedicelli saepissime villosuli; fructus ovoideo- vel anguste ellipsoideo-conici, apice subattenuati, plerique satis longe pedicellati. 3. *S. Gooddingii.*

Folia foliolaque pedunculorum subtus discoloria, plusminusve glaucescentia vel concoloria viridia sed superne haud vel sparse stomatifera et non lineari-lanceolata et ad basim laminae vel apice petioli distincte glandulifera.

Petioli etiam foliolorum pedunculorum distincte glanduliferi; ramuli floriferi plusminusve nitiduli; fructus satis breviter et crasse pedicellati vel folia subtus viridescentia; ramuli ut videtur semper valde fragiles. (Species sect. *Pentandrae,* subsect. *Lucidae*).

Amenta valde serotina, brevia, vix duplo longiora quam crassa; folia subtus distincte glaucescentia, superne estomatifera; fructus 7–12 mm. longi pedicello iis circiter 5-plo breviore excluso . . . . . 5. *S. serissima.*

Amenta coetanea vel serotina, saepissime plus quam 2½–3-plo longiora quam crassa vel folia subtus concoloria vel fructus breviores.

Folia foliolaque subtus albescentia vel glaucescentia . . 6. *S. lasiandra.*

Folia foliolaque subtus concoloria, viridia.

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only a short peduncle bearing a few small leaflets. In this case a form of the *Longifoliae* may look rather like one of the *Nigrae* but the nervation and serration of the leaves and the structure of the flowers, especially of the stigmas is so different that it is impossible to confuse them.

Stomata in pagina superiore foliorum plusminusve numerosa; folia lanceolata, 4–5-plo longiora quam lata . 6c. *S. lasiandra* var. *caudata.*
Stomata in pagina superiore foliorum nulla vel sparsa; folia late ovata vel elliptico-lanceolata, (f. *angustifolia* excepta) haud ultra 3½-plo longiora quam lata . . . . . 7. *S. lucida.*
Petioli eglandulosi vel stomata in pagina superiore foliorum nulla et folia satis indistincte glanduloso-denticulata.
Ramuli floriferi plusminusve flavescentes, fragiles, non distincte rubescentes vel purpurascentes, glabri; foliola glaberrima; petioli foliorum maturorum satis tenues et longi, quam lamina vix ultra 6-plo breviores, vel folia superne stomatifera (Species sect. *Triandrae*) . . 4. *S. amygdaloides* et var. *Wrightii.*
Ramuli floriferi rubescentes vel purpurascentes vel parce pilosi; folia glabra vel satis sericea; petioli breviores vel laminae superne estomatiferae (Species sect. *Bonplandianae*).
Fructus satis parvi crassique, breviter ovoideo-conici, apice vix vel paullo attenuati, 4–5 mm. longi, pedicello satis crasso iis 4–5-plo breviore excluso vel pedicelli (basisque fructuum) pilosi.
Ramuli annotini dense tomentosi; amenta coetanea; fructus circiter 4 mm. longi, basi pedicelloque pilosi . . . . . 8. *S. jaliscana.*
Ramuli annotini glabri (interdum novelli villosuli); amenta ex axillis foliorum adultorum orientia vel coetanea; fructus circiter 5 mm. longi, glabri . . . . . 9. *S. Bonplandiana.*
Fructus 5–9 mm. longi, apice subito vel longius attenuati vel pedicello gracili iis saepe tantum duplo breviore suffulti.
Stipulae intus in facie plusminusve glanduliferae, parvae vel nullae; fructus vix ultra 6 mm. longi pedicello iis subduplo ad 3-plo breviore excluso . . . . . 10. *S. laevigata.*
Stipulae intus in facie haud glanduliferae, interdum tantum pilosae (vel in *S. Harbisonii* pauciglandulosae), saepe satis magnae; fructus 6–10 mm. longi pedicello subduplo vel duplo (rarius ad 4-plo) breviore excluso.
Ramuli tenaces; folia superne haud stomatifera . . 11. *S. longipes*
Ramuli fragiles; folia superne saltem secundum costam stomatifera. 12. *S. Harbisonii*

B. **Bracteas florum (saltem ad apicem) brunnescentes, fuscae vel atrofuscae, rarius stramineae sed sub fructu persistentes.**

a. Flores glandulis duobus (ventrali et dorsali) instructi.[1]

Amenta serotina, pseudoterminalia, anguste cylindrica; folia coriacea, superne conspicue inciso-reticulata, rugulosa.
Bracteae intus tantum brevipilosae; fructus vix ultra 4.5 mm. longi; petioli elongati, ad 3 cm. longi; frutex prostratus . . . . . 21. *S. reticulata.*
Bracteae utrinque plusminusve sericeo-pilosae; fructus 5–7 mm. longi; petioli breves, gemmis vix longiores; frutex prostratus vel suberectus. 22. *S. vestita.*
Amenta ovoidea vel ovoideo-cylindrica, saepe pauciflora, coetanea; folia tenuiora, minima vel superne vix vel indistincte reticulata; frutices prostrati. 24. *S. nivalis.*

b. Flores glandula una ventrali instructi

1. *Frutices humiles prostrati ramis radicantibus; amenta coetanea vel saepissime serotina; folia sub anthesi pleraque satis evoluta* (2, vide p. 101).

o Ovaria (pedicellique) etiam juvenilia glaberrima.

Folia utrinque concoloria viridia et stomatifera, minima vel parva; bracteae plusminusve concolores, flavescentes vel violascentes, vix vel parce brevipilosae.[2]

[1] A dorsal gland may occasionally be observed in the flowers of *S. brachycarpa*, *S. chlorolepis*, *S. fullertonensis*, *S. glacialis*, *S. hudsonensis*, *S. pseudolapponum* and *S. rotundifolia*. These species have bicolor bracts or distinctly lateral aments or oblong stigmas. I have not found a dorsal gland in the flowers of *S. leiolepis*.

[2] See also *S. Peasei* which certainly is a hybrid between *S. herbacea* and *S. Uva-ursi*.

Folia semper crenato-dentata, utrinque tenuiter reticulata, anni praeteriti nunquam persistentia . . . . . 27. *S. herbacea.*

Folia integerrima, adulta sicca per secundum annum vel diutius persistentia.

Nervi laterales foliorum utrinque plusminusve elevati, venulae etiam prominulae (confer etiam 29. *S. phlebophyllam* cujus fructus interdum glaberrimi sunt) . . . . . 28. *S. rotundifolia.*

Nervi laterales foliorum superne tenuissime tantum incisi, subtus prominentes sed venulae haud visibiles . . . . . 30. *S. Dodgeana.*

Folia subtus discoloria, distincte pallidiora, saepissime pruinosa.

Ovaria etiam juvenilia distincte pedicellata; pedicelli fructuum glandulam fere semper 2–3-plo superantes.

Glandula oblongo-rectangularis, 2–3-plo longior quam crassa; styli distincti, apice bifidi stigmatibus brevibus oblongis vix vel paullo longiores; pedicell fructuum saepe bracteis subaequilongi vel longiores, 1.5–3 mm. longi. 89. *S. fuscescens.*

Glandula subquadrata, vix longior quam crassa; styli apice bifidi stigmatibus brevibus oblongis subduplo longiores; pedicelli fructuum quam bracteae plusminusve breviores . . . . . 37b. *S. arctophila* var. *lejocarpa.*

Ovaria subsessilia vel pedicelli etiam fructuum glandula plusminusve breviores vel vix longiores.

Folia (saltem ad medium et apicem) glanduloso-crenato-denticulata, superne stomatiferar, adulta marcescentia partim diu persistentia; stipulae saepe distinctae; styli apice bifidi stigmatibus brevissimis bifidis 2–2½-plo longiores . . . . . 26. *S. Uva-ursi.*

Folia integerrima, rariter basim versus pauci-dentata; stipulae nunquam distinctae (confer etiam formam glabram *S. phlebophyllae* foliis adultis marcescentibus persistentibus distinctam).

Amenta 3–4-plo longiora quam crassa, 3–5 cm. longa, (saltem basi) sublaxiflora; folia majora ultra 3 cm. longa, superne non stomatifera. 34b. *S. arctica* f. *glabrata.*

Amenta etiam fructifera vix ad ½-plo longiora quam crassa, densiflora; folia etiam maxima vix ultra 2.5 cm. longa vel superne stomatifera.

Styli satis breves, stigmatibus mediocribus vix longiores; fructus maturi saepissime glaucescentes; folia matura subtus conspicue elevato-reticulata . . . . . 35. *S. ovalifolia.*

Styli elongati tenues, stigmatibus angustis longis saepe plusminusve longiores; fructus maturi vix glaucescentes; folia subtus vix conspicue reticulata . . . . . 36. *S. stolonifera.*

oo Ovaria (interdum tantum partim vel nonnisi pedicelli) plusminusve dense pilosa; fructus saepe glabriores vel subglabri.

Folia utrinque concoloria viridia vel viridi-glaucescentia, aequaliter stomatifera, sub anthesi perfecte evoluta vel adulta sicca pro parte persistentia; styli plerique distincti, saepe apice bifidi stigmatibus oblongis bifidis ad duplo longiores.

Ramuli floriferi breves tenusimi, saepissime tantum 2-foliati; folia adulta sicca non persistentia . . . . . 25. *S. polaris.*

Ramuli floriferi saepissime plurifoliati; folia adulta sicca persistentia.

Folia glabra, utrinque laete viridia, apice saepius obtusa; fructus breviter sed satis distincte pedicellati . . . . . 29. *S. phlebophylla.*

Folia saltem novella superne pubescentia, subtus subpallidiora, apice acuta vel subacuminata; fructus plus minusve sessilia. . . . 31. *S. cascadensis.*

Folia subtus subtus discoloria, plusminusve glaucescentia, sub anthesi saepe nondum perfecte evoluta et adulta non persistentia.

Folia circumcirca satis dense minute glanduloso-serrata, obovata, fere glabra; stipulae distinctae, lanceolatae, serratae; amenta pedunculo excluso 5–6:1.5 cm. magnae (species rara alaskana) . . . . . 64. *S. Chamissonis.*

Folia integerrima vel plusminusve crenato-denticulata vel plantae aliis signis diversae.

Bracteae bicolores, apice vel pro parte maxima fuscae, versus apicem plusminusve longe sericeae, interdum apice tantum ciliatae (confer etiam *S. glacialem* speciem arcticam valde incomplete cognitam stylo subnullo a sequentibus diversam).

Stigmata linearia elongata, stylo tenui satis longo plusminusve 2–3-plo breviora; ovaria fructusque saepe ad apicem tantum pilosi.
36a. *S. stolonifera* f. *subpilosa.*

Stigmata brevia vel oblonga vel styli iis distincte breviores.

Folia subtus (in sicco) paullo pallidiora (haud distincte glaucescentia vel albescentia), leviter elevato-nervata sed vix reticulata, saepissime lanceolata vel elliptico-lanceolata, utrinque acuta vel apice obtusa, superne stomatifera, etiam maxima vix ad 4:1.8 cm. magna, fere semper integerrima; fruticulus ramulis hornotinis flavescentibus tenuibus satis brevibus . . . . . 32. *S. petrophila.*

Folia subtus distincte glaucescentia, pruinosa, superne haud stomatifera vel diversiformia vel plantae aliis signis diversae (confer clavem in Bot. Gaz. LXVII, 32).

Glandula ventralis satis brevis et lata, vix duplo altior quam crassa, apice late truncata, pedicellis fructuum duplo breviores; amenta submatura et fructifera 5–10 :1.2–1.6 cm. magna; fructus pedicello excluso 6.5–8 mm. longi; folia superne estomatifera, nitidula, saepe obsolete denticulata (confer etiam 38. *S. hudsonensem*, speciem raram incomplete cognitam) . . . . . 37. *S. arctophila.*

Glandula oblonga pleraque 2½–4-plo longiora quam crassa et pedicelli fructuum glandula breviores vel rarius sublongiores vel plantae aliis signis diversae.

Amenta fructifera ellipsoideo-globosa, circiter 1–1.5 :1.5 cm. magna; folia subcoriacea, vix ultra 1.8:1.5 cm. magna, superne estomatifera, subtus elevato-reticulata, utrinque saltem initio ut ramuli novelli villosula . . . . . 35b. *S. ovalifolia* var. *pubescens.*

Amenta fructifera cylindrica longiora; folia tenuia vel majora, subtus haud conspicue elevato-reticulata (confer etiam 89b. *S. fuscescens* var. *hebecarpam* pedicello saepe tantum piloso bracteae parvae plerumque parce pilosae subaequilongo distinctam).

Folia superne haud stomatifera; petioli 9–20 mm. longi; amenta fructifera 6:1.3 ad 9:1.8 cm. magna; fructus pedicello brevi excluso (6–)8–10 mm. longi . . . . . 34. *S. arctica.*

Folia superne stomatifera; petioli vix ad 10 mm. longi; amenta fructifera vix ad 5.5 : 1.5–1.8 cm. magna; fructus 7–8 mm. pedicello brevi excluso longi . . . . . 33. *S. anglorum.*

Bracteae concolores, stramineae vel flavescentes vel laete brunnescentes, satis brevipilosae (pilis bractea brevioribus), intus interdum glabratae. Confer formas parvas plusminusve prostratas 47. *S. cordifoliae* et species raras incomplete cognitas 39. *S. fullertonensem* et 49. *S. lingulatam.*

2. *Frutices erecti vel arbusculi, ramis nunquam repentibus et radicantibus; amenta praecocia vel coetanea; folia sub anthesi haud vel vix semi-evoluta.*

α Ovaria (pedicellique) etiam juvenilia glaberrima (β vide p. *103*).

* Pedicelli distincti, etiam sub anthesi[1] glandulam 2-plo usque 6-plo superantes; styli (stigmataque) breves [2]). (**, vide p. *102*).

Bracteae concolores flavescentes vel flavo-brunnescentes, in vivo interdum paullo rubescentes, in sicco saepe brunnescentes; amenta coetanea, etiam florifera pedunculo foliolato suffulta.

Foliola foliaque utrinque viridia, (saltem superne) pubescentia et stomatifera; pedicelli ad 1.8 mm. longi, glandulam vix ultra 2½-plo superantes.
69. *S. commutata.*

Foliola foliaque subtus discoloria, plusminusve glaucescentia vel folia superne glabra estomatifera et pedicelli sub fructu ultra 3 mm. longi.

[1] "Sub anthesi" refers to fully developed flowers of which the stigmas and the glands are not yet withered. Later when the fruits begin to ripen or are quite matured the size and shape of the stigmas and of the gland usually changes more or less by withering. If the flowers are too young the pedicels mostly are shorter.

[2] The styles are "short" if they are almost wanting or not longer than from 0.5 to 1 (or hardly 1.25) mm.; the stigmas may be of equal length or hardly half as long.

Petioli etiam foliolorum 5 mm. longi vel longiores; foliola foliaque circumcirca glanduloso-crenato-serrata, basi saepissime cordata; glandula brevis, subcrassoir quam alta; fructus rostrati pedicello ad 4 mm. longo excluso 7–9 mm. longi . . . . . 72. *S. pyrifolia.*

Petioli etiam foliorum maturorum vix ultra 6 mm. longi; foliola foliaque integerrima, non cordata; glandula oblongo-ellipsoidea; fructus satis obtuse conici, pedicello 3.5–4.5 mm. longo excluso 6–7 mm. longi. 87. *S. pedicellaris.*

Bracteae bicolores, apice vel pro parte maxima fuscescentes; amenta florifera subsessilia (confer etiam speciem raram quebecensem 73. *S. obtusatam*).

Amenta in axillis foliorum adultorum apparentia, vix ultra 2 cm. longa; stigmata parva (species mexicanae).

Ramuli floriferi glabri . . . . . 52. *S. mexicana.*

Ramuli floriferi tomentosi.

Glandulae oblongae, pedicellis ovariorum tantum 2–2½-plo breviores; gemmae foliiferae apice plusminusve rostratae . . . . 51. *S. Hartwegii.*

Glandulae quam pedicelli ovariorum 4–5-plo breviores; gemmae foliiferae tantum acutae . . . . . 53. *S. Schaffneri.*

Amenta praecocia vel subcoetanea.

Stigmata satis crassa stylo brevi crasso subaequilonga; amenta florifera circ. 3:1 cm. magna, coetanea, basi foliolata; bracteae utrinque pilis haud crispis sericeo-lanatae, pedicellis fructuum vix ultra 2 mm. longis subduplo longiores. Species mexicana . . . . . 99. *S. Rowleei.*

Stigmata minima, stylo 0.5–1.25 mm. longo breviora vel aequilonga vel pubescentia bractearum sericeo-crispa.

Styli 1–1.25 mm. longi; amenta sub anthesi 2.5–3.5:0.9, fructifera ad 8:2 cm. (pedunculo excluso) magna; fructus 9–10 mm. longi pedicellis 2–2.5 mm. longis exclusis . . . . . 67. *S. glaucophylloides.*

Styli vix ultra 0.8 mm. longi; amenta saepissime minora et fructus breviores.

Ramuli floriferi plusminusve lutei vel flavescentes; fructus 4–5 mm. longi pedicellis 1.5–3 mm. longis exclusis . . . . . 60. *S. lutea.*

Ramuli floriferi fusci, brunnescentes vel castanei.

Bracteae distincte obovatae, apice plusminusve rotundatae, saltem extus dense (saepe breviter) albo-sericeae; amenta praecocia, sessilia, fructifera ad 6:1.3 cm. magna; fructus 5–7 mm. longi, pedicellis 2–3 mm. longis exclusis . . . . . 55. *S. lasiolepis.*

Bracteae oblongiores, subacutiores, saepe satis angustae vel laxius sericeae vel plantae aliis signis diversae.

Ramuli floriferi crassi satis pubescentes vel tomentosi; amenta fructifera 6–10:1.8 cm. magna; fructus 8–10 mm. longi pedicellis interdum fere ad 3 mm. longis exclusis . . . 58. *S. missouriensis.*

Ramuli floriferi glabri vel amenta fructusque minores.

Pedicelli fructuum 4–6 mm. longorum 2.5–4 mm. longi. Vide 59. *S. mackenzieanam* et 61. *S. monochromam.*

Pedicelli vix ad 2.3 mm. longi. Confer species sequentes: 56. *S. ligulifolia*, 52. *S. cordata*, 63. *S. pseudocordata*, et 62. *S. myrtillifolia.*

** Pedicelli nulli vel breves, etiam sub fructu glandulam haud ultra 2-plo superantes; styli (stigmataque) longitudine variabiles.

Stipulae anni praeteriti persistentes; amenta crasse cylindrica, sessilia, versus apicem ramulorum brevium 1–3 pseudoterminalia; ramuli saltem novelli dense hirsuto-villosi lanuginosive.

Stipulae lineari- ad semicordato-lanceolatae, acuminatae, glanduloso-serrato-dentatae . . . . . 74. *S. Richardsonii.*

Stipulae semicordatae ad reniformes, dense glanduliferae.

Petioli brevissimi, vix ultra 4 mm. longi; folia fere semper integerrima. 75. *S. calcicola.*

Petioli 8–15 mm. longi; folia plus minusve glanduloso-subserrata. 76b. *S. Barrattiana* var. *Tweedyi.*

Stipulae nullae vel haud persistentes; amenta saepe coetanea, pedunculata, pleraque distincte lateralia.
Ramuli floriferi saepissime pruinosi; amenta praecocia, sessilia, densiflora. 54. *S. irrorata.*
Ramuli floriferi nunquam pruinosi.
Bracteae concolores, flavescentes, stramineae vel flavo-brunnescentes, brevipilosae vel tantum breviter ciliatae; amenta parva vel minima; ovaria sessilia.
Glandula interdum etiam dorsalis adest; bracteae glabrae vel tantum ciliatae . . . . . 40. *S. chlorolepis.*
Glandula tantum unica ventralis; bracteae plusminusve utrinque brevipilosae . . . . . 41b. *S. brachycarpa var. glabellicarpa.*
Bracteae bicolores, apice vel pro parte maxima fuscescentes vel longe sericeae et amenta majora et ovaria pedicellata.
Amenta etiam florifera distincte pedunculata, basi foliolis parvis satis normalibus praedita vel pubescentia bractearum non crispa.
Folia utrinque concoloria et stomatifera, novella et saepissime etiam matura plusminusve adpresse villosa vel sericea.
Stipulae nullae vel minimae; folia integerrima; pubescentia satis argenteo-sericea; amenta etiam fructifera vix ultra 1.5 : 1 cm. magna . . . . . 50. *S. Wolfii.*
Stipulae distinctae; folia (saltem inferiora) plusminusve dense glanduloso-denticulata vel -serrata vel amenta etiam florifera majora.
Bracteae florum fere semper fuscae; pedicelli saepissime vix ad 1 mm. longi; folia circumcirca densissime glanduloso- (saepe fimbriato-) serrulata vel serrata . . . . . 68. *S. adenophylla.*
Bracteae florum satis flavo-brunneae; pedicelli saepissime 1–1.8 mm. longi; folia minimis exceptis integerrima vel saltem versus basim plusminusve brevissime glanduloso-denticulata subserratave . . . . . 69. *S. commutata.*
Folia subtus discoloria, saepius pruinosa, superne haud (vel parce) stomatifera.
Styli 2–2.5 mm. longi; amenta pedunculo 2–4-foliolato ad 2 cm. longo instructa; stipulae nullae . . . . . 77. *S. amplifolia.*
Styli 1–1.5 mm. longi; amenta brevius pedunculata vel stipulae plusminusve evolutae.
Foliola pedunculorum estipulata, saepissime squamiformia.
Ramuli novelli hornotinique (et saepe floriferi) plusminusve dense tomentosi . . . . . 78. *S. Hookeriana.*
Ramuli novelli tantum sparse pilosi, cito glaberrimi. 79. *S. Piperi.*
Foliola pedunculorum stipulata, satis normalia (confer etiam speciem alaskanam incomplete cognitam *S. Walpolei*). 65. *S. Barclayi*
Amenta etiam fructifera sessilia vel subsessilia, basi tantum foliolis minimis squamiformibus instructa vel pubescentia bractearum plusmniusve distincte crispa.
Styli (1–)1.5 mm. longi; amenta fructifera densiflora; ramuli floriferi plusminusve vivide fuscescentes vel brunnescentes, saepe nitiduli. 66. *S. monticola.*
Styli 0.5–0.75 mm. longi; amenta fructifera satis laxiflora; ramuli floriferi obscure vel sordide brunnescentes, fusco-olivacei vel plusminusve pilosi . . . . . 57. *S. cordata.*

β Ovaria (rariter tantum pedicelli basisve ovarii) pilosa.

* Pedicelli distincti etiam sub anthesi glandulam 2-plo usque 6-plo superantes (**, vide p. *104*).

Ramuli floriferi pruinosi . . . . . 85. *S. Geyeriana.*
Ramuli floriferi nunquam pruinosi.

Bracteae concolores, flavescentes stramineae vel flavo-brunnescentes; amenta coetanea (confer etiam speciem raram canadensem 45. *S. Maccallianam* foliis circumcirca dense crenato-dentatis distinctam).

Styli nulli vel brevissimi stigmatibus brevibus oblongis non longiores (confer etiam 92. *S. petiolarem* quae interdum bracteas satis flavo-brunneas habet).

Folia novella subtus saepissime pilis sericeis argenteis et fulvis praedita, lineari- vel anguste lanceolata; amenta etiam fructifera vix ultra 2:1.5 cm. magna; styli brevissimi; fructus 6–7 mm., pedicelli 1.8 – 3 mm. longi. 85c. *S. Geyeriana* var. *meleina.*

Folia nunquam fulvo-pilosa, late lanceolata, ovata vel ovato-oblonga; amenta etiam sub anthesi ad 2.5:0.8 cm. et pedicelli 3–5 mm. longi. 84. *S. Bebbiana.*

Styli distincti, stigmatibus aequilongi vel sublongiores.

Pubescentia foliolorum argenteo-sericea; ramuli floriferi glabri, fusci; fructus 4.5–5.5 mm. longi pedicello excluso . . . . 114. *S. argyrocarpa.*

Pubescentia foliolorum ramulorumque floriferorum villoso-tomentosa; fructus circiter 7 mm. longi pedicello excluso (confer etiam 69d. *S. commutatam* var. *puberulam*) . . . . . 83. *S. cryptodonta.*

Bracteae bicolores, versus apicem vel pro parte maxima fuscescentes; amenta saepe praecocia (confer etiam 63. *S. pseudocordatam*).

Fructus vix ultra 4–5 mm. longi, ovoideo-conici, obtusiusculi, non rostrati; pedicelli vix ultra 1.5 mm. longi; amenta praecocia, etiam fructifera densiflora foliolis tantum parvis linearibus paucis suffulta; folia novella dense adpresse sericea (confer etiam speciem incomplete cognitam 91. *S. coactilem*). 90. *S. sericea.*

Fructus longiores, rostrati; amenta praecocia vel coetanea.

Amenta minima vel parva, etiam fructifera vix ad 2:1.5 cm. longa, praecocia; ramuli floriferi vix ad 2 mm. crassi, purpurascentes sed plusminusve sordide tomentelli; pedicelli ad 2 mm., fructus 7–9 mm. longi. 94. *S. tristis.*

Amenta etiam florifera majora vel plantae aliis signis diversae.

Stigmata satis elongata, 4–5-plo longiora quam crassiora, pleraque 1–1.5(–2) mm. longa, stylo saepe subnullo longiora; amenta praecocia, satis crasse cylindrica, bracteis dense et longe sericeis; fructus 7–14 mm. longi pedicello 1–3.5 mm. longo excluso. Vide 95. *S. discolorem* et *96. S. Scoulerianam* et speciem mexicanam incomplete cognitam.

Stigmata brevi-oblonga, vix ultra 3-plo longiora quam crassa vel plantae aliis signis diversae.

Ramuli floriferi glabri fusci, castanei vel rubro-brunnei (sicci saepe nigrescentes), saepissime nitiduli; folia anguste lanceolata, apice sensim acuminata (confer etiam 79. *S. Piperi* foliis latioribus ovariis tantum versus apicem pubescentibus distinctam).

Amenta saepissime pedunculo distincto 2–5-foliolato suffulta, etiam fructifera densiflora; folia normalia etiam sub anthesi semievoluta utrinque stomatifera, sparse minute denticulata; petioli vix ultra 7 mm. longi . . . . . 86. *S. Lemmonii.*

Amenta saepissime subsessilia vel fructifera satis laxiflora et folia normalia sub anthesi nondum evoluta superne estomatifera, densius denticulata; petioli ad 13(–15) mm. longi . . . 92. *S. petiolaris.*

Ramuli floriferi saltem pro parte villoso-tomentelli vel obscure et sordide fuscescentes vel brunnescentes; folia plus minusve oblonga, apice obtusiora vel tantum subito brevi-acuminata; amenta saepe praecocia, etiam fructifera sessilia, densiflora; pedicelli 1.5 –2 mm. longi (confer etiam 78. *S. Hookerianae* formam) . . . 93. *S. humilis.*

** Pedicelli nulli vel breves, etiam sub fructu glandulam haud ultra 2-plo superantes.

= Stipulae anni praeteriti persistentes; amenta sessilia; styli graciles elongati.

Ramuli floriferi plerique villoso-tomentosi; stipulae semicordato-lanceolatae ad lanceolatae, margine intusque dense glanduliferae . . . . 76. *S. Barrattiana.*

Ramuli floriferi glabri vel stipulae lineari-lanceolatae, intus non glanduliferae. 100. *S. pulchra.*

==Stipulae nunquam persistentes, saepe nullae. Ramuli floriferi plusminusve distincte pruinosi; amenta praecocia; folia normalia subtus dense sericea vel sericeo-velutina, saepe micantia (confer clavem in Jour. Arnold Arb. I. 69). Vide 106. *S. bellam*, 104. *S. pellitam* et 105. *S. subcoeruleam.*

Ramuli floriferi nunquam pruinosi vel folia glabra.

Bracteae florum concolores, flavescentes stramineae vel flavo-brunneae (confre etiam speciem valde incomplete cognitam 110. *S. delnortensem*).

Pubescentia versus apicem bractearum pilis sericeis bractea saepiss me subaequilongis vel sublongioribus constituta; amenta anguste cylindrica; fructus tantum 4–5.5 mm. longi; styli graciles, bifidi, circiter 1.5 mm. longi, stigmatibus parvis bifidis.[1]

Glandula lineari-ellipsoidea, interdum bracteae subaequilonga; amenta plusminusve praecocia, fructifera ad 3.5 : 1 cm. magna; fructus sessiles; folia subsessilia anguste lanceolata . . . . . 109. *S. Breweri.*

Glandula crassior vel bractea duplo brevior; amenta saepe coetanea, ad 13 : 1.3 cm. magna; fructus subsessiles; folia obovato- ad elliptico-oblonga . . . . . 112. *S. Coulteri.*

Pubescentia bractearum pilis sericeis quam bractea distincte brevioribus constituta et plantae aliis signis diversae (confer etiam clavem in Bot. Gaz. LXVII. 34).

Petioli brevissimi, plerique 1–2 mm. tantum longi, gemmas bene evolutas non superantes et stipulae petiolis aequilongae vel duplo longiores.

Frutex prostratus ramis repentibus; folia superne sparse stomatifera. 39. *S. fullertonensis.*

Frutices parvi erecti ramis saepe satis brevibus subtortuosis; folia supern estomatifera.[2]

Fructus maturi 7–8 mm. longi; styli ovariorum saepissime sessilium brevissimi, vix ad 0.5 mm. longi; ramuli hornotini densissime albosericeo-villosi . . . . . 42. *S. niphoclada.*

Fructus maturi vix ultra 6 5 mm. longi vel stigmata stylis aequilonga vel sublongiora vel ramuli etiam novelli minus dense griseo- vel subflavescenti-villosi . . . . . 41. *S. brachycarpa.*

Petioli gemmis vel stipulis longiores.[3]

Folia circumcirca dense glanduloso-crenato-denticulata, subtus subconcoloria, utrinque stomatifera, novella saepe ferrugineo-villosula. 45. *S. Maccalliana.*

Folia integerrima vel satis sparse denticulata, subtus discoloria (Vide 48. *S. anamesam*, 47. *S. cordifoliam*, 46. *S. glaucam* et 44. *S. pseudolapponum.*[4])

Bracteae florum bicolores, saltem ad apicem vel pro parte maxima fuscae.

Ramuli etiam floriferi plusminusve tomentelli vel villosuli; juveniles densius pilosi (confer etiam 70. *S. Eastwoodiae*, 101. *S. paraleucam*, 90. *S. sericeam* et 50. *S. Wolfii*).

Ovaria et folia subtus distincte et dense sericeo-pilosa pubescentia argenteomicante; stigmata brevissima stylis vix ultra 1 mm. longis subtripio breviora . . . . . 111. *S sitchensis.*

Ovaria et folia subtus dense tomentosa vel floccoso-tomentosa vel villosa, stigmata oblongiora vel sublinearia.

Amenta etiam fructifera pedunculo excluso vix ultra 5:1.5 cm. magna; ovaria et folia subtus tomento denso subfloccoso vel subfarinaceo obtecta; fructus ellipsoideo-conici pedicello vix 1 mm. longo excepto 7–8 longi . . . . . 82. *S. candida.*

[1] See also 82. *S. candida* of which the flower-bracts often are rather light brown, but it is easily recognized by its dense almost floccose tomentum of the ovaries and fruits.

[2] See also 40b. *S. chlorolepis* var. *antimima* which has stomata in the upper surface of its leaves.

[3] See also 43. *S. desertorum* and 49. *S. lingulata*, two very little known arctic species.

[4] This is a difficult group of species for which I have given a key in Bot. Gaz. LXVII, p. 36–37.

Amenta etiam florifera pleraque ultra 4 cm., fructifera ad 7–13 cm. longa vel pubescentia haud floccosa vel farinacea.
Styli tantum 1–1.2 mm. longi; amenta subsessilia vel pedunculata.
Fructus 7–9 mm. longi; stipulae nullae; folia subtus satis dense tomentosa supra obscure viridia . 78c. *S. Hookeriana* var. *tomentosa.*
Fructus 6–7 mm. longi; stipulae semicordatae ad 10 mm. longae, caducae; folia subtus glabrescentia, glaucescentia, supra nitidula. 80. *S. laurentiana.*
Styli 1.2–2.5 mm. longi; amenta sessilia vel subsessilia; stipulae lineari lanceolatae; folia subtus tomento densissimo opaco molli vestita. 81. *S. alaxensis.*

Ramuli floriferi et etiam saepe novelli glabri.
Stigmata subsessilia, parva brevia, stylis brevissimis saepe bifidis aequilonga; fructus parvi, ellipsoideo-conici, satis obtusi pedicello glandulam duplo vel ultra supreante excluso vix plusquem 5 mm. longi. . 90. S. sericea
Stigmata stylis distinctis suffulta vel oblongiora vel fructus longiores.
Amenta distincte coetanea, etiam florifera pedunclo saepissime brevi foliolato suffulta.
Folia utrinque concoloria et stomatifera, novella plusminusve dense adpresse sericea.
Fructus sessiles, vix ultra 5.5 mm. longi, laxe villosuli; styli ad 1 mm. longi stigmatibus minimis bifidis circiter triplo longioribus. 50b. *S. Wolfii* var. *idahoensis.*
Fructus brevipedicellati, 6–8 mm. longi, saepissime satis dense villosuli vel styli et stigmata longiores.
Folia minora pedunculorumque circumcirca dense glanduloso-denticulata; fructus vix ultra 6.5 mm. longi pedicello 0.5—1 mm. longo excluso . . . . . 70. *S. Eastwoodiae.*
Folia etiam minora pedunculorumque vix vel satis distanter glanduloso-denticulata; fructus 7–8.5 mm. longi pedicello ad 1.5 mm. longo excluso . . . . . 71. *S. orestera*
Folia subtus discoloria plusminusve glaucescentia, pubescentia novellorum interdum pilis fulvis mixta.
Fructus maturi ellipsoideo-conici, vix rostrati, 4.5–5.5 mm. longi; folia etiam adulta subtus tomento sericeo denso adpresso micante vel subopaco obdita . . . . . 108. *S Jepsonii.*
Fructus maturi plusminusve rostrati, ultra 8 mm. longi folia novella subtus plusminusve sericeo-villosula vel villosa, cito glabrescentia.
Styli vix ad 1 mm. longi; foliola pedunculorum linearia vel ut normalia angustifolia, novella plusminusve fulvo-pilosa. 71. *S. orestera.*
Styli 1–2 mm. longi; foliola pedunculorum et folia plusminusve ovalia, ovato-oblonga vel ovato-lanceolata, novella tantum griseo-pilosa (confer etiam 67. *S. glaucophylloidem* quae interdum pedicellum pilosum praebet) . . . . . 65. *S. Barclayi.*
Amenta praecocia, etiam fructifera plusminusve sessilia.
Styli breves, 0.2–0.8 mm. longi, stigmatibus subbreviores; fructus 5–7.5 mm. longi, pedicello 0.5–1.25 mm. longo excluso; amenta satis anguste cylindrica, fructifera ad 6:1.2 cm. magna; folia majora anguste lanceolata, adulta glabra, novella plusminusve fulvo-sericea . . . . . 113. *S. arbusculoides.*
Styli longiores vel plantae aliis signis diversae.
Folia etima matura subtus velutino-tomentosa (species valde incomplete cognita) . . . . . 107. *S. Drummondiana.*
Folia etima novella nunquam tomentosa, matura glaberrima vel fere glabra
Ovaria tantum parce saltem ad apicem pilosa . . . . 79 *S. Piperi.*
Ovaria dense sericeo-tomentosa vel villosula (confer etiam clavem in Jour. Arnold Arb. I. 68 et 101. *S. paraleucam* speciem imperfecte cognitum).
Fructus perfecte maturi 5–6 mm. longi . . . . 102. *S. planifolia.*
Fructus perfecte maturi 7–8 mm. longi . . . . 103. *S. pennata.*

III.

CLAVIS SPECIERUM SECUNDUM SPECIMINA STERILIA FOLIIS MATURIS BENE EVOLUTIS INSTRUCTA[1]

A. Frutices minimi vel parvi repentes ramis radicantibus

a. Folia utrinque concoloria et stomatifera.[2]

Folia adulta sicca per secundum annum vel plures annos persistentia, saepissime marcescentia.
- Forma foliorum saepissime orbicularis vel late ovalis basi apiceque rotundata, folia vix ad 11:10 mm. magna, adulta sicca anno secundo decidua. 28. *S. rotundifolia.*
- Forma foliorum magis elliptica vel lanceolata vel folia longiora et adulta sicca plures annos persistentia.
  - Folia elliptica, obovato-oblonga vel late spathulata, apice tantum interdum rotundata, ad 15:9 mm. magna . . . . . 29. *S. phlebophylla.*
  - Folia lingulata, lineari- vel anguste lanceolata vel oblanceolata, apice saepissime subplicato-acuminata, ad 18:5 mm. magna, subtus plusminusve subpallidiora . . . . . 31. *S. cascadensis.*

Folia adulta sicca nunquam persistentia.
- Folia margine semper crenato-serrata . . . . . 27. *S. herbacea.*
- Folia margine integerrima vel in *S. polari* interdum sparse crenato-denticulata.
  - Pagina utraque foliorum distincte (sed saepe tenuiter) reticulata. 25. *S. polaris.*
  - Pagina inferior foliolorum non reticulata; nervi primarii in pagina superiore tenuissimi incisi, subtus prominentes; folia vix ultra 5–8:3–4 mm. magna. 30. *S. Dodgeana.*

b. Folia subtus discoloria, plusminusve glaucescentia,[3] saepe superne estomatifera.

Folia circumcirca satis dense minute glanduloso-serrata, obovata, fere glabra, ad 3.5 : 1.5 – 2.1 cm. magna; stipulae distinctae, lanceolatae, serratae. 63. *S. Chamissonis.*

Folia integerrima vel denticulata vel crenato-dentata vel stipulae nullae.
- Pagina superior foliorum satis coriaceorum conspicue inciso-reticulata; folia margine crenulata vel integerrima (confer etiam 23. *S. leiolepidem*).
  - Frutex prostratus; folia cito glaberrima vel pilis paucis sericeis obsita, vix ad 5: 5.5 cm. magna; petioli elongati, ad 3 cm. longi . . 21. *S. reticulata.*
  - Frutex prostratus vel erectus; folia etiam adulta subtus dense sericea vel majora, oblongiora et margine plusminusve distincte crenulata vel petioli breves gemmis vix longiores . . . . . 22. *S. vestita.*
- Pagina superior foliorum magis chartaceorum non conspicue (vel in *S. nivali saximontana* parce) inciso-reticulata.
  - Stipulae nullae (vel minimae vix ultra 1 mm. longae et citissime caducae).
    - Folia adulta sicca marcescentia partim diu persistentia, matura glabra, plusminusve (saltem ad medium et apicem) glanduloso-crenato-denticulata, superne nitidula et stomatifera, vix ultra 2.5 cm. longa. 26. *S. Uva-ursi.*
    - Folia adulta nunquam (vel in *S. nivali* interdum pauca integerrima et superne estomatifera) persistentia.
      - Nervi primarii (et saepissime secundarii) paginae superioris foliolorum satis incisi; folia crasse chartacea, subtus albescentia, elevato-reticulata, superne estomatifera, minima subrotunda vel ad 3.5 cm. longa et late elliptica, petiolis satis longis . . . . . 24. *S. nivalis.*
      - Nervi primarii paginae superioris foliorum (saltem in sicco) plus-minusve elevati; folia chartacea vel subtus vix albescentia vel superne stomatifera.

[1] This key is aimed to enable an approximate determination of the species according to sterile specimens only. In a good many cases it will not be possible to identify a specimen properly unless the flowers or fruits are at hand or it is known that it comes from a district where only a limited number of species occurs. It is extremely difficult to propose a reliable key without the help of drawings or photographs.

[2] Of *S. cascadensis* the leaves are usually somewhat paler underneath.

[3] Of *S. petrophila* the under surface of the leaves is usually not or not much paler.

Folia superne stomatifera.
Folia subtus (in sicco) paullo pallidiora, leviter elevato-nervata, sed vix reticulata; petioli 1–6 mm. longi . . . 32. *S. petrophila.*
Folia subtus distincte discoloria, plusminusve reticulata, petiolis ad 10 mm. longis (confer etiam 33. *S. anglorum*). 36. *S. stolonifera.*
Folia superne estomatifera.
Pagina inferior foliorum perfecte maturorum saepissime satis distincte elevato-reticulata; folia pleraque ovalia vel ovato-elliptica (confer etiam speciem incertam *S. glacialem*) . . 35. *S. ovalifolia.*
Pagina inferior foliorum vix elevato-reticulata; folia pleraque magis rhombeo-obovata, basim versus satis attenuata. 89. *S. fuscescens.*
Stipulae saepissime distincte evolutae (saltem in ramis vegetis).[1]
Folia superne stomatifera (confer etiam 39. *S. fullertonensem* speciem incomplete cognitam petiolis vix ad 2 mm. longis distinctam). 33. *S. anglorum.*
Folia superne estomatifera.
Petioli vix ultra 8 mm. longi; folia superne satis nitidula, normalia superiora etiam initio glaberrima, saepe (saltem partim) indistinte glanduloso-denticulata vel subcrenulata (confer etiam speciem incomplete cognitam 38. *S. hudsonensem*) . . . . . 37. *S. arctophila.*
Petioli foliorum majorum 9–25 mm. longi; folia saltem novella plusminusve sericea, pleraque integerrima . . . . . 34. *S. arctica.*

B. Frutices erecti vel arbores ramis non repentibus radicantibusve

a. FOLIA SESSILIA VEL SUBSESSILIA PETIOLIS BREVISSIMIS HAUD ULTRA 2(–3) MM. LONGIS INSTRUCTA

Stipulae adultae siccae per secundum annum persistentes; folia late ovata vel elliptico-orbicularia, basi saepe cordata, ad 6.5: 4.7 cm. magna; ramuli hornotini hirsuto-lanati . . . . . 75. *S. calcicola.*
Stipulae nunquam persistentes; folia lineari- ad late lanceolata.
Folia utrinque concoloria et stomatifera, linearia vel lineari-lanceolata (confer etiam 50. *S. Wolfii* speciem foliis latioribus lanceolatis vel anguste elliptico-lanceolatis distinctam).
Laminae vix ad 30:3.5 mm. magnae; stipulae saepe evolutae. 13. *S. taxifolia.*
Laminae foliorum satis evolutorum saepissime haud minus quam 5 cm. longae.
Stipulae fere semper nullae; folia integerrima vel remote tantum denticulata; petioli saepissime ultra 3 mm. longi. Vide 18. *S. exiguam* et *S. sessilifoliam* var. *Hindsianam* et var. *leucodendroidem.*
Stipulae plusminusve distinctae; folia saepe (salten ad apicem) plusminusve distincte subspinulso-denticulata, interdum paene sessilia. 14. *S. sessilifolia.*
Folia subtus distincte discoloria, glaucescentia vel pruinosa.
Pubescentia foliorum etiam novellorum tantum grisea vel albescens.
Pagina superior foliorum stomatifera; folia adulta subtus tantum ad costam pilis sparsis praedita, lanceolata ad anguste obovalia, ad 2.2:0.6 vel 2.5 : 1.4 cm. magna; stipulae nullae; ramuli hornotini glabri. 40. *S. chlorolepis.*
Pagina superior estomatifera; folia subtus etiam in facie pilosa vel ramuli hornotini non glabri.
Basis foliorum rotundata ad subcordata vel obtuse cuneata (vix sensim attenuata); folia vix ultra 5–6-plo longiora quam lata.
Folia perfecte matura subtus satis elevato-reticulata, dense villosula vel villoso-sericeo-tomentosa, 4:0.5–1.2 ad 6:0.8–1 cm. magna; species rara californica . . . . . 109. *S. Breweri.*

[1] See also creeping forms of 47. *S. cordifolia* which has a shorter more villose pubescence especially on the upper surface of its leaves, but it is often almost impossible to distinguish certain forms of those Arctic species without the aid of flowers or fruits.

Folia etiam matura subtus vix reticulata sed elevato-nervata.
Stipulae pleraeque evolutae; ramuli hornotini densissime albo-sericeo-villosi; folia 1.5:0.5 ad 3.5:0.9–1 cm. magna; species arctica satis imperfecte cognita . . . . . 42. *S. niphoclada.*
Stipulae pleraeque nullae vel minimae; ramuli hornotini vel saepissime tantum novelli minus dense griseo- vel subflavescenti-sericeo-villosi; folia ad 2.5–3:(0.6-)1 vel 3.4:0.8 vel ad 3:1.1 cm. magna. 41. *S. brachycarpa.*
Basis foliorum acuta vel sensim attenuata; folia ad ultra 10-plo longiora quam lata; stipulae nullae vel in ramulis vegetis distinctae. 94. *S. tristis.*
Pubescentia foliorum saltem novellorum pilis ferrugineis griseisque mixta; species valde incomplete cognita mexicana . . . . . 115. *S. cana.*

b. Folia distincte petiolata petiolis 3–20 mm. longis instructa.

1. *Petioli versus apicem (vel basis laminae) glandulis distinctis saepe irregulariter lobulatis praediti; folia plusminusve dense glanduloso-denticulata serratave.*

Folia matura subtus distincte albescentia vel glaucescentia.
Laminae elliptico-lanceolatae, apice acutae, vix ultra 9:2.8 cm. magnae, superne estomatiferae . . . . . 5. *S. serissima.*
Laminae apice plusminusve acuminatae vel caudatae, ad 16:4 vel 19:2.5 cm. magnae, superne estomatiferae vel stomatibus paucis instructae. 6. *S. lasiandra.*
Folia subtus concoloria viridescentia (interdum pallide viridia sed non glaucescentia).
Laminae utrinque aequaliter stomatiferae, plusminusve lanceolatae et sensim caudato-acuminatae, pleraeque 4–5-plo longiores quam latae. 6c. *S. lasiandra* var. *caudata.*
Laminae superne haud vel sparse stomatiferae vel late ovatae, ellipticae vel elliptico-lanceolatae et semper plusminusve subito caudato-acuminatae vel haud ultra 3-plo longiores quam latae (in *f. angustifolia* 5–6-plo longiores quam latae iis *S. lasiandrae caudatae* saepe similes sed basim versus magis angustatae . . . . . 7. *S. lucida.*

2. *Petioli (vel basis laminae) eglandulosi.*[1]

α Ramuli hornotini annotinique distincte pruinosi.[2]

Folia (novella saepe excepta) glaberrima,[3] anguste lanceolata vel plusminusve oblanceolata, apice acuta, basi saepe obtuse cuneata, superne vivide viridia, estomatifera, subtus albescentia, plusminusve distanter glanduloso-denticulata, 4.5:0.9 ad ultra 10:2 cm. magna . . . . . 64. *S. irrorata.*
Folia semper (saltem subtus) tomentosa vel sericea.
Stipulae distinctae, lineari-lanceolatae, ad 22:2 mm. magnae; folia obovato- vel elliptico-oblonga vel late lanceolata, 4.5:1.5 ad 10 : 3.2 cm. (vel ultra) magna, integerrima, subtus tomento densissimo opaco albo vel flavescente molli vestita costa saepe glabrescente prominula . 81b. *S. alaxensis longistylis.*
Stipulae nullae vel parvae vel folia haud integerrima.
Pubescentia pilis adpressis sericeis argenteis fulvisque mixta; folia parva, anguste lanceolata, integerrima, utrinque acuta, 3:0.6 ad 7:1.8 cm. magna, interdum subglabrescentia sed pilis adpressis tenuissimis difficila recognoscentibus semper plusminusve obtecta vel pulchre argenteo-sericea. 85. *S. Geyeriana.*

[1] Small inconspicuous glands may be observed in *S. Bonplandiana, S. laevigata, S. longipes* and sometimes also in *S. amygdaloides.*

[2] The species of which the one year old (or older) branchlets, sometimes even the young shoots are more or less covered with a glaucous bloom are mentioned again later because the bloom may not always be present or sufficiently distinct.

[3] Of 102. *S. planifolia* the twigs are sometimes pruinose. Its leaves are lanceolate to obovate-oblong, entire or only partly denticulate and measure from 2:07 to 5:1.5–2 cm. See also 104a. *S. pellitam psilam* the leaves of which are mostly linear-lanceolate with a subrevolute and subcrenulate margin, and a very close nervation beneath.

Pubescentia argentea vel subflavescens, sericea vel tomentosa. Vide clavem in Jour. Arnold Arb. I, 69, et confer 106. *S. bellam*, 104. *S. pellitam* et 105. *S. subcoeruleam.*

β. Ramuli nunquam (vel interdum valde indistincte) pruinosi.

o Folia utrinque concoloria, viridia vel pubescentiae griseae argenteaeve causa cinereo-viridescentia.

Ramuli[1] foliaque ab initio glaberrima vel novella tantum pilosa cito glabrecentia, adulta (costa superne rarius etiam subtus interdum excepta) glabra, sed petioli saepe plusminusve dense pubescentes.

Folia linearia ad anguste lanceolata vel maxima lanceolata, semper 4-ad ultar 10-plo longiora quam lata, utrinque aequaliter stomatifera.

Laminae semper dense anguste glanduloso-crenato-dentatae vel -serratae, dentibus circiter 3–6 pro 5 mm., subtus tenuissime sed distincte angustissime reticulatae.

Ramuli annotini biennesque plusminusve rufescentes vel purpurascentes.

Stipulae intus fere semper eglandulosae; petioli satis longi laminae comparati; species austro- et centrali-americana . . 1. *S. Humboldtiana.*

Stipulae intus plusminusve glanduliferae vel petioli breves (id et quam latitudo laminae haud longiores (species boreali-americana). 2. *S. nigra.*

Ramuli annotini biennesque plusminusve distincte flavescentes vel flavo-cinerei . . . . . 3. *S. Gooddingii.* .

Laminae subintegerrimae vel satis distanter et saepe subspinuloso-serratae, dentibus 0–2 pro 5 mm.,[2] subtus satis laxe reticulatae . . 20. *S. longifolia.*

Folia elliptico- vel oblanceolata ad late elliptica vel ovato-elliptica vix ultra 4-plo longiora quam lata superne interdum parcius stomatifera.

Stipulae ut videtur semper multae; folia anguste elliptico-lanceolata vel anguste elliptico-oblonga, basi acuta vel obtusa apice subacuta vel breviter subacuminata, 1.5:05 ad 6.5:1.6 cm. magna, minute glanduloso-crenato-dentata dentibus 2–4 pro 5 mm.; petioli 2–8 mm. longi. 45. *S. Maccalliana.*

Stipulae pleraeque evolutae, saepe parvae, vel folia latiora, basi saepe subcordata vel subintegerrima.

Petioli vix ultra 3–4 mm. longi; folia apice obtusa vel subacuta, margine crenato-dentata vel vrenata, elliptica, elliptico-oblonga vel obovalia vix ad 5:2.5 vel 6:1.8 cm. magna.....62. *S. myrtillifolia.*

Petioli (5-)6–14 mm. longi; folia apice distincte acuta vel acuminata, margine dentata, serrata vel subintegra; magis ovato-vel elliptico-lanceolata ad 10:3.5–4 cm. magna.

Folia etiam matura satis membranacea, satis dense serrato-dentata, apice saepissime subito acuminata.....61. *S. monochroma.*

Folia crassiora, magis distanter dentata vel subintegra, apice vix, acuminata.....63. *S. pseudocordata.*

Ramuli foliaque plusminusve dense et pleraque utrinque pilosa.

Folia linearia ad anguste lanceolata, semper 4-plo ad ultra 8–10-plo longiora quam lata, utrinque aequaliter stomatifera. stipulae fere semper nullae (vide clavem in Bot. Gaz. LXVII, p. 312–316). Confer 17. *S. argophyllam*, 18. *S. exiguam*, 15. *S. fluviatilem*, 16. *S. Parishianam* et 14. *S. sessilifoliae* varietates.

Folia vix ultra 4-plo longiora quam lata, elliptica vel oblanceolata ad late elliptica vel ovato-elliptica, 76 *S. Barrattiana* excepta utrinque stomatifera; stipulae fere semper plusminusve evolutae.

Stipulae nullae vel minimae; folia normalia superiora integerrima, satis parva, vix ultra 4:1.8 cm. magna, oblanceolata, elliptico-lanceolata vel rhomboideo-oblanceolata, basi (saepe obtuse) cuneata, plusminusve adpresse argenteo-sericae . . . . . 50. *S. Wolfii.*

[1] Of 76a *S. Barrattiana Tweedyi* the youngest twigs are more or less tomentose while the leaves become almost glabrous throughout. This rare Willow is easily distinguished by its persistent conspicuously glandular stipules.

[2] See also 19. *S. melanopsis* of which the leaves are mostly somewhat glaucescent or distinctly paler beneath.

Stipulae saepe distincte evolutae vel folia majora.
Stipulae adultae siccae glabrescentes margine intusque glanduliferae, semicordatae per secundum annum persistentes; folia elliptica vel ovalia, superne, estomatifera, utrique plusminusve dense villosula, margine glandulis parvis obsita. . . . . 76. *S. Barrattiana,*
Stipulae nunquam persistentes.
Folia circumcirca dense vel densissime glanduloso- (saepe fimbriato-) serrulata vel serrata, basi plusminusve cordata . . 68. *S. adenophylla.*
Folia (minora excepta) plusminusve integerrima vel brevissime vel distanter glanduloso-denticulata subserratave, basi vix subcordata. Confer 69. *S. commutatam* et 70. *S. Eastwoodiae.*

oo Folia subtus distincte discoloria, saepissime glaucescentia, glabra vel plusminusve dense pilosa.

* Pagina inferior foliorum adultorum semper omnino pubescentia densa argenteo-sericea villosa vel tomentosa obtecta rete nervillarum saepissime haud visibili.[1]

Pubescentia foliorum ramulorumque floccoso-tomentosa vel pseudofarinacea; folia linearia vel lineari-lanceolata, superne plusminusve rugulosa, obscure viridia, subtus elevato-reticulata vel -nervata, 3.5:0.6 ad 9:1 cm. magna, stipulacea. 82. *S. candida.*
Pubescentia villoso-tomentosa vel sericea vel foliorum forma diversa.
Folia subtus tomento denso sericeo plusminusve adpresso argenteo-micante obtecta.
Laminae distincte et plusminusve dense, interdum crebre glanduloso-serratae, anguste vel late lanceolatae, basi acutae vel obtusae, apice plusminusve acuminatae, 4:1 ad 12:2.3 cm. magnae subtus tomento interdum satis tenui adpresso micante praeditae (confer etiam 91. *S. coactilem*). 90. *S. sericea.*
Laminae integerrimae vel plusminusve (saepissime indistincte) crenato-denticulatae.
Folia pleraque elliptica vel obovato-elliptica vel obovato-lanceolata vel minora oblanceolata, 4:1.3 ad 12:4.5 cm. magna, basi saepissime cuneata, apice obtusa vel subapiculata, subtus tomento denso brevi subadpresso sericeo micante obtecta; nervi laterales satis approximati et paralleli ut costa flava glabrescens elevati; stipulae pleraeque distinctae. 111. *S. sitchensis.*
Folia magis lanceolata vel anguste oblanceolata; stipulae nullae vel minimae.
Pubescentia pilis satis longis sericeis constituta, saepe laxa; folia parva, etiam maxima vix ultra 5:1.3 cm. magna; ramuli hornotini fusci, plusminusve glabri . . . . . 114. *S. argyrocarpa.*
Pubescentia pilis brevissimis constituta; folia 3.5:0.9 ad 8:2 vel 12:1.5 cm. magna; ramuli hornotini densius pilosi(confer etiam 105. *S. subcoeruleam* quae interdum ramulos haud pruinosos habet). 108. *S. Jepsonii.*
Folia subtus tomento villoso denso vel laxiore obtecta.
Pubescentia (saltem foliorum juveniliorum) pilis griseis et fulvis mixta; folia plusminusve distincte vel obscure crenata vel serrato-dentata.
Folia lanceolata vel oblanceolata, pleraque ultra 3½–4-plo longiora quam lata.[2] Confer 55. *S. lasiolepidis* formas et speciem mexicanam 51. *S. Hartwegii.*
Folia magis elliptico-lanceolata, ovata, elliptica vel obovato-oblonga, pleraque vix ultra 3(–3½)-plo longiora quam lata. Confer 95b. *S. discolorem latifoliam,* 97. *S. paradoxam* et 96. *S. Scoulerianae* formas.
Pubescentia tantum pilis griseis albisve composita; folia saepe integerrima.
Folia integerrima, subtus tomento denso albescenti obtecta, haud anguste vel lineari-lanceolata vel stipulae distinctae.

[1] If the pubescens of the mature leaves is becoming so thin that even the minute reticulation can be seen more or less clearly the species are mentioned under the next paragraph.
[2] See also forms of 93. *S. humilis* and the little known Mexican species 8. *S. jaliscana.*

Textura foliorum satis crasse chartacea; folia superne satis impresse et subtus satis elevato-nervata et reticulata, obovato-oblonga, elliptico-oblonga vel rarius elliptico-lanceolata, 5:1.5 ad 8:2.2 vel 12.5 : 3 cm. magna; petioli crassi, breves, vix ultra 6 mm. longi; stipulae non linearilanceolatae . . . . . 112. *S. Coulteri.*

Textura foliorum tenuiter chartacea vel folia utrinque laeviora, magis obovata vel petioli satis tenues longiores, stipulae plus-minusve linearilanceolatae (confer etiam speciem raram incomplete cognitam 107. *S. Drummondianam*) . . . . . 81. *S. alaxensis.*

Folia plusminusve distincte vel obscure crenulata vel crenato-dentata vel satis anguste lanceolata et stipulae nullae vel minimae.

Laminae lineari- vel late lanceolatae, pleraeque ultra 4-ad 10-plo longiores quam latae, margine valde indistincte vel haud crenulatae, saepe fere subrevolutae. Confer 106. *S. bellam* et 104. *S. pellitam.*

Laminae magis ellipticae, elliptico-oblongae, ovatae vel late oblanceolatae, vix ultra 3½-plo longiores quam latae (confer etiam speciem incomplete cognitam mexicanam 53. *S. Schaffneri*).

Stipulae pleraeque distinctae sed interdum parvae; petioli satis tenues, 3–10 mm. longi; folia rariter ultra 3(–3.5) cm. lata (confer etiam speciem incomplete cognitam 83. *S. cryptodontam*) . 84. *S. Bebbiana.*

Stipulae nullae; petioli satis crassi, 7–20 mm. longi; folia saepissime 3.5 ad 5 cm. lata . . . . . 78. *S. Hookeriana.*

* Pagina inferior foliorum adultorum plusminusve glabrescens rete nervillarum distincte visibili vel glaberrima.

† Stipulae siccae anni praeteriti per secundum annum persistentes.

Petioli 5–15 mm. longi; stipulae lineares ad semicordato-lanceolatae, margine denticulatae vel glanduloso-serrato-dentatae.

Ramuli hornotini hirsuto-tomentosi; folia obovato-elliptica vel elliptico-lanceolata vel obovato-oblonga, ad 5.5 –8:3.5–6 cm. magna, margine praesertim versus basim glanduloso-denticulata . . . . . 74. *S. Richardsonii.*

Ramuli glaberrimi, nitiduli, fusci vel in var. *yukonensi* villoso-tomentosi; folia plusminusve rhomboideo-oblanceolata, obovato-oblonga vel rhomboideo-elliptica, 4:1.5 ad 6:2.5 cm. magna, saepissime integerrima . . 100. *S. pulchra.*

Petioli vix ultra 4 mm. longi; stipulae semicordatae vel reniformes, margine dense glanduliferae; folia late ovata ad orbicularia, ad 2.5:1.3 cm. magna, subtus paullo pallidiora . . . . . 75. *S. calcicola.*

†† Stipulae nunquam persistentes, nullae vel caducae.

= Laminae anguste vel late lanceolatae, saepissime ultra 4–5plo longiores quam latae. (= = see p. *113*).

Folia distincte et satis dense denticulata serratave, dentibus 3–8 pro 1 mm.

Pubescentia mixta, pilis griseis fulvisque composita,

Petioli 3–7 mm. longi, villosuli; folia basim versus subintegerrima, subtus satis villosula vel minora subglabra, ad 8:1.5 cm. magna, apice acuta. 51. *S. Hartwegii.*

Petioli longiores vel folia circumcirca dense serrato-denticulata vel subtus demum ut petioli glaberrima

Folia mediocria vix ultra 8:1.5 cm. magna, adpresse tenuiter sericeavel glabra, vix distincte acuminata; petioli 6–10(–13) mm. longi, glabri. 92. *S. petiolaris.*

Folia mediocria ultra 13:2.5 cm. magna, magis anguste ovato-lanceolata, plusminusve breviter villosula et satis longe acuminata; petioli ad 20 mm. longi, pilosi, superne saepe ad basim laminae glandulis parvis obsiti. 11. *S. longipes.*

Pubescentia tantum grisea vel argentea vel nulla (in *S. arbusculoidi* interdum pilis paucis fulvis mixta).

Laminae foliorum adultorum utraque facie glaberrimae (petioli costaeque interdum parce vel dense puberulae).

Stipulae nullae vel parvae, petiolis triplo breviores.

Folia satis distanter (tantum apicem versus densius) breviter denticulata, dentibus vix ultra 3–4 pro 1 cm., anguste elliptico-lanceolata, apice breviter acuminata, basi cuneata 5:1–13:2 cm. magna; petioli apice nunquam glandulosi . . . . . 54. *S. irrorata.*

Folia circumcirca dense breviter crenato-serrata; petioli apice saepe glanduliferi.

Petioli glabri vel tantum superne in sulco pilosuli; folia ovato- vel elliptico-lanceolata, basi obtuse cuneata ad rotundata, apice longe acuminata, 6:1.2–12:2.5 cm. magna . . . . . 9. *S. Bonplandiana.*

Petioli undique pilosuli vel folia plusminusve lineari-lanceolata, ad 13:1.2 cm. magna (confer etiam 12. *S. Harbisonii*).
11b. *S. longipes* var. *venulosa.*

Stipulae distinctae.

Forma foliorum anguste oblonga, marginibus utrinque plusminusve parallelis, basi rotundata ad cordata, apice vix acuminata, folia ad 8:1.2–2 cm. magna; stipulae petiolis tantum 3–7 mm. longis sublongiores, intus haud glanduliferae . . . . . 52. *S. mexicana.*

Forma foliorum lanceolata vel anguste elliptico- vel ovato-lanceolata, basi acuta vel obtuse cuneata apice acuminata, folia ad ultra 11:2 cm. magna; stipulae petiolis ad 15 mm. longis breviores intus glanduliferae (confer etiam 11c. *S. longipes* var. *Wardii*) . . . . 10. *S. laevigata.*

Laminae foliorum etiam adultorum utraque facie vel tantum subtus pilosae.

Pubescentia sericea, adpressa, plusminusve argentea.

Folia subtus fere glabra, pilis adpressis difficile recognoscendis praedita, satis laevia, costa flavescente elevata glabra, 1.5: 0.4–9:1.8 cm. magna; petioli 4–8 mm. longi . . . . . 113. *S. arbusculoides.*

Folia subtus distinctius argenteo-pilosa, magis reticulata, costa plusminusve pilosula, ad 12:2.5 cm. magna; petioli ad 11 mm. longi.
90. *S. sericea.*

Pubescentia villosula, haud argentea.

Folia lanceolata ad ovato-oblonga, majora ultra 2.5 cm. lata vel pubecentia tantum grisea . . . . . 58. *S. missouriensis.*

Folia saepissime anguste lanceolata vel anguste ovato-lanceolata, pubescentia pilis griseis fulvisque mixta vel folia matura glaberrima.
11. *S. longipes.*

Folia integerrima vel distanter (saepe obscure et satis repando-) denticulata dentibus pro 1 cm. vix plus quam 2 vel petioli vix ultra 5 mm. longi et folia utrinque stomatifera.[1]

Petioli vix ultra 5 mm. longi; folia linearia ad lineari-lanceolata, subtus saepe paullo discoloria, glaberrima vel pilis sparsis adpressis difficile visibilibus obdita, utraque facie acqualiter stomatifera, 5:0.5 ad 13:1.2–2 cm magna.
19. *S. melanopsis.*

Petioli longiores vel folia supra medium latiora vel integerrima.

Pubescentia (saltem foliorum novellorum) pilis griseis fulvisque mixta; ramuli hornotini glaberrimi, fusci vel flavo-rubri.

Folia vix ultra 6:0.8 cm. magna, integerrima.
85c. *S. Geyeriana* var. *meleina.*

Folia ad 10:1 5–2 cm. magna, saepe plusminusve distanter denticulata.
86. *S. Lemmonii.*

Pubescentia tantum grisea vel ramuli novelli plusminusve dense tomentelli vel pilosuli; folia saepissime supra medium latiora, magis oblanceolata, ad 11:2 cm. magna, plusminusve repando-denticulata . . . . 93. *S. humilis.*

== Laminae oblongo-ellipticae, ovatae vel ovato- vel elliptico-lanceolatae, vix ultra 3½(–4)plo longiores quam latae.

: Folia integerrima vel tantum pro parte satis distanter et saepe indistincte dentata crenatave.[2]

[1] See also such forms as 82b. *S. candida denudata* et 104a. *S. pellita psila* and such a critical species as the Arctic 43. *S. desertorum.*

[2] Leaves of more vigorous branchlets of some of these species may show a rather distinct dentation but the normal leaves are entire or slightly dentate or crenate or bear only a few distant teeth.

Stipulae etiam in ramis vegetis nullae vel pubescentia saltem foliorum juvenilium pilis ferrugineis et griseis mixta.

Pubescentia nunquam pilis ferrugineis mixta; stipulae nullae.

Folia 5–8 cm. longa, ovalia vel late obovata, apice rotundata vel obtusa; superne estomatifera; petioli pilosi; species rara alaskana. 77. *S. amplifolia.*

Folia etiam majora vix ultra 4:1.8 cm. magna, lanceolata, oblanceolata elliptico-lanceolata, anguste elliptica ad obovato-lanceolata, rarius elliptica vel oblonga, apice acuta vel subacuminata, basi cuneata ad rotundata, superne stomatifera . . . . . 44. *S. pseudolapponum.*

Pubescentia saltem foliorum juvenilium pilis fulvis vel ferrugineis mixta; stipulae nullae vel plusminusve evolutae.

Folia majora normalia ultra 5–6 ad 13 cm. longa; stipulae interdum evolutae, satis late semicordatae, pedicello duplo breviores.

Laminae satis oblanceolatae vel obovato-oblongae, supra medium latiores vel satis anguste lanceolatae, ad ultra 11:1.5–4 cm. magnae. 55. *S. lasiolepis.*

Laminae magis ellipticae vel elliptico-ovales vel elliptico-lanceolatae, ad 10:3.8 vel 13: 3.5 cm. magnae.[1] Confer species mexicanas: 98. *S. oxylepidem,* 97. *S. paradoxam* et 99. *S. Rowleei.*

Folia maxima minora, etiam in surculis vix ad 6(–6.5) cm. longa; stipulae nullae vel parvae, magis lanceolatae, cito deciduae.

Forma foliorum normalium anguste ad late obovata vel obovato-oblonga, basi plusminusve cuneata, apice subito brevissime acutata vel plicato-acuta, 4:1.8–6:3.3 vel ad 7:3 cm.; species rara . . . . 103. *S. pennata.*

Forma foliorum normalium magis lanceolata, ovato-lanceolata, oblanceolata vel elliptica.

Pagina inferior foliorum satis anguste reticulata nervillis etiam plusminusve elevatis; folia anguste lanceolata ad late oblanceolata, elliptico-lanceolata vel elliptica, apice satis obtusa, 3:0.8 ad 4.5:1.3 vel 2:1 ad 6:2 cm. magna, superne estomatifera . . . 87. *S. pedicellaris.*

Pagina inferior foliorum laevior nervis plusminusve sed nervillis haud vel vix elevatis; folia elliptica vel obovato-oblonga, ovato-lanceolata ad elliptico-lanceolata, apice acutiora, 2:0.7 ad 5:2–1.5 cm. magna, superne saepe stomatifera . . . . . 102. *S. planifolia.*

Stipulae (saltem in ramulis vegetioribus) distinctae; pubescentia etiam foliorum novellorum nunquam pilis ferrugineis fulvisve mixta.

Folia superne estomatifera. Vide clavem in Bot. Gaz. LXVII. p. 37, et confer 47. *S. cordifoliam* et 46. *S. glaucam.*

Folia superne stomatifera. Vide clavem, l. c., p. 36–37, et confer 44. *S. anamesam* et 48. *S. pseudolapponum.*

: : Folia circumcirca plusminusve dense rarius satis distanter dentata, dentato-serrata vel crenata.

Laminae longe caudato-acuminatae, anguste ad late lanceolatae vel ovato-lanceolatae, basi cuneatae ad rotundatae, margine dense glanduloso-serratae vel crenato-serratae, 6:1.5 ad 10:3 vel 15:3.5 cm. magnae, superne plusminusve stomatiferae, utrinque glabrae; petioli satis graciles, 6–20 mm. longi . . . . . 4. *S. amygdaloides.*

Laminae haud caudato-acuminatae vel basi cordatae vel petioli breviores haud glabri.

Pubescentia (saltem foliorum juvenilium) pilis griseis fulvisque mixta;[2] stipulae in ramulis vegetis distincte evolutae.

Petioli etiam foliorum majorum vix ultra 10 mm. longi; stipulae minimae petiolis 2–3-plo breviores; folia lanceolata vel elliptico-lanceolata; ramuli novelli villosuli vel tomentosuli.

Folia elliptica vel elliptico-lanceolata, basi obtusa rotundave, apice acuta vel brevi-acuminata, 5.5:2.3 ad 7:2.5 vel 8:1.7–2 cm. magna,

[1] Similar almost entire leaves may occur with 95. *S. discolor* or 96. *S. Scouleriana.* These species have a very variable foliage of which it is impossible to give here an ample description.

[2] The fulvous hairs of the pubescence are sometimes very difficult to detect or only found on young leaves (as in *S. Piperi* and some forms of *S. discolor.*)

plusminusve dense subdistincte glanduloso- serrato-denticulata; petioli undique tomentelli; species rara mexicana . 8. *S. jaliscana.*

Folia lanceolata vel oblongo-lanceolata, basi cuneata vel obtusa, apice acuta vel sensim breviter acuminata, 5.5: 1.7 ad 10:2.7 cm. magna, indistincte crenato- vel undulato- dentata; petioli superne puberuli; species rara quebecensis . . . . . 101. *S. paraleuca.*

Petioli saltem foliorum majorum longiores vel stipulae majores vel folia latiora.

Folia tantum juvenilia pilosa, adulta papyracea, subtus satis laevia, nervillis haud vel vix prominulis, elliptico-oblonga ad late elliptico-lanceolata, basi obtusa ad rotunda, apice acuta vel subito et oblique breviter acuminata, 7:3 ad 12:4–15:5 cm. magna, plusminusve irregulariter subundulato-denticulata; ramuli glaberrimi; petioli 10–20 mm. longi (confer etiam formas glabras 95. *S. discoloris* foliis subtus saepissime evidentius reticulatis) . . . . . 79. *S. Piperi.*

Folia pleraque etiam adulta plusminusve pilosa, textura crassiore vel subtus evidentius reticulata vel magis lanceolata vel oblanceolata. Confer 95. *S. discolorem* et 96. *S. Scoulerianam.*

Pubescentia nunquam pilis fulvis mixta, saepe etiam foliorum novellorum nulla (in *S. coactili* interdum pubescentia partim fulva adest).

Folia novella pellucida, balsamifera, citissime glaberrima, late ovata, elliptica vel elliptico-oblonga, basi pleraque rotundata vel subcordata, apice obtusa ad subacuminata, subtus conspicue reticulata, margine dense crenato-serrata vel crenata, 2.5–3:1.5–1.8 ad 7:3 vel 10.5 :3.5 vel 9:5 cm. magna; petioli (5–)8–25 mm. longi; stipulae nullae vel minimae; ramuli glabri, castanei, nitiduli . . . . 72. *S. pyrifolia.*

Folia novella haud balsamifera vel aliis signis diversa (confer etiam species mihi nonsatis cognitae 73. *S. obtusatam* et 88. *S. prolixam*).

Laminae apice plusminusve breviter acuminatae,[1] maximae saepissime ultra 7–9 cm. longae, ovato-vel elliptico-lanceolatae vel elliptico-oblongae, fere semper infra medium latissimae.

Ramuli annotini biennesque lutescentes vel flavescentes, partim rubescentes; folia ovato-oblonga, elliptico-lanceolata vel lanceolata, subintegra vel plusminusve obscure, rarius distinctius densius que glanduloso-serrata, superne satis flavescenti-viridia, ad 10–13.5: 2–3.5(–6) cm. magna; stipulae saepissime lunatae vel subreniformes, intus basi glandulosae . . . . . 60. *S. lutea.*

Ramuli annotini biennesque plusminusve fuscescentes, purpurascentes, castanei vel sordide brunnescentes.

Folia margine plusminusve irregulariter conspicue et argute lobulato-dentata dentibus patentibus ad 2 mm. longis, oblonga vel elliptico-lanceolata, 7:2 ad 11(–15): 2.5–3(–4) cm. magna, subtus initio dense sericeo-pubescentia, matura satis glabrescentia; stipulae lanceolatae, acuminatae, ad 8 mm. longae (species rara ex Maine) . . . . . 91. *S. coactilis.*

Folia breviter serrata vel crenato-dentata vel subintegra et signis aliis diversa.

Pagina superior foliorum vivide viridis et plusminusve nitida; folia ab initio glaberrima vel novella superne tantum in costa pilosa.

Stipulae (in surculis exceptae) nullae vel narvae, lanceolatae ad subreniformes, petiolis 2- ad pluriplo breviores; folia etiam matura subchartacea, ovato- vel elliptico-lanceolata, interdum obovato-lanceolata, basi cuneata ad cordata, 7:1.5–2.5 ad 14:6.3 cm. magna, plusminusve breviter serrata vel serrato-denticulata . . . 59. *S. mackenzieana.*

Stipulae distinctae, late semicordatae, ad 13:8 mm. magnae; folia chartacea, ovata vel ovato-elliptica, basi rotundata ad

[1] It is an extremely difficult task to characterize the differences of the leaves of the following species without the help of a series of good illustrations. I do not pretend to give more than a few hints which may lead other students to the elaboration of a more useful key.

leviter cordata, 7:3.5–9(-9.5):3.8(–4.2) vel angustiora ad 10:2.5 cm. magna, satis dense saepe crebre crenato-serrata vel -dentata . . . . . 67. *S. glaucophylloides.*

Pagina superior foliorum satis obscure viridis; folia saltem novella etiam in facie pubescentia, saepissime oblongo-lanceolata vel satis anguste lanceolata, interdum late lanceolata vel elliptico-lanceolata, serrata, ad 10:2–4 cm. magna; stipulae distinctae, reniformes ad ovatae . . . . . 57. *S. cordata.*

Laminae apice tantum acuta (rarius subito brevissime acuminatae), maximae vix ad 7 cm. longae (surculorum exceptae), vel obovato-oblongae vel obovato-ellipticae et medio vel supra medium latissimae (Confer etiam species raras paullo cognitas 80. *S. laurentianam* et 73. *S. obtusatam*).

Folia saltem matura subtus satis reticulato-nervata, pubescentia (vel glabra et vix ultra 5 cm. longa et fere integerrima), obovato-oblonga, elliptica vel obovato-elliptica, basi cuneata vel obtusa, 5:2 ad 8:3.5 vel oblongiora 5:1.5 ad 10:3 cm., minora 1.5:1 ad 3.5:1.6 cm. magna, integra vel plusminusve undulata obscure crenata vel (saltem in surculis) serrato-dentata; stipulae nullae vel minimae lanceolatae, tantum in surculis semicordatae . . 84. *S. Bebbiana.*

Folia subtus satis laevia, graciliter reticulata, glabra vel fere glabra, majora ad 7:2 vel 12:4 cm. magna, basi cuneata ad rotundata vel subcordata, distincte crenato-dentata vel- serrata; stipulae saepius distinctae. Confer 64. *S. Barclayi*, 66. *S. monticolam* et 78b. *S. Hookerianam laurifoliam.*

BERLIN-DAHLEM, *March*, 1921.

NAMES APPLIED TO AMERICAN WILLOWS BUT NOT MENTIONED IN THE PRECEDING NOTES

S. arctica a. *cordifolia* Dippel, Handb. Laubholzk II. 311 (1892).—Syn. *S. cordifolia* Pursh.

S. arctica var. *Pallasii* f. *crassijulis* Kurtz in Bot. Jahrb. XIX. 406 (1894).

S. cordata latifolia Zabel in Beissner, Schelle and Zabel, Handb. Laubholz-Ben. 36 (1903), nomen.

S. cordata serrata Zabel, l. c. (1903).

S. cordata integra Zabel, l. c. 37 (1903), nomen.

S. cordata brevifolia Zabel, l. c. (1903), nomen.

S. cordata angustifolia Zabel, l. c. (1903).

S. cordata vestita Zabel, l. c. (1903).

S. cordata discolor Zabel, l. c. (1903), nomen.

S. cordata viridula Zabel, l. c. (1903), nomen.

S. cordata vitellina Zabel, l. c. (1903), nomen.

S. formosula Gandoger, Fl. Eur. XXI. 167 (1890).—Gandoger considers this *S. cordata* × *sericea*; see also *S. Bebbii*, p. 80.

S. humilis S. oxyriphea Gandoger, l. c. 167 (1890).

S. humilis S. brachycephala Gandoger, l. c. (1890).

S. hybrida Rafinesque in Med. Repos. N. York V. 352 (1800), nomen.

S. myrtilloides hypoglauca Ball in Can. Alpine Jour. Sp. No. 85 (1913). = *S. pedicellaris* var. *hypoglauca* Fernald.

S. Parishii Gandoger in Bull. Soc. Bot. France, LXVI. 289 (1920).

S. petiolaris S. flavinervia Gandoger, Fl. Eur. XXI. 168 (1890).

S. petiolaris S. Torreyana Gandoger, l. c. (1890).

S. Suksdorfii Gandoger in Bull. Soc. Bot. France, LXVI 289 (1920).

S. Torreyana Barratt, Sal. Am. No. 29 (1840).

S. washitana Muhlenberg apud Rafinesque, Fl. Ludov. 138 (1817), nomen

S. wyomingensis Rydberg in Bull. Torr. Bot. Club, XXVIII. 271 (1901) = *S. Austinae* × *pseudolapponum* according to Rydberg, Fl. Rocky Mts. 198 (1917).

INDEX

TO THE SECTIONS, SPECIES, VARIETIES AND FORMS OF THE AMERICAN WILLOWS DESCRIBED OR MENTIONED IN "NOTES ON AMERICAN WILLOWS, I–XII."

Synonyms are printed in italics; new combinations published in this number in bold face type; the accepted names of sections in small caps.

The Roman numerals refer to volumes I–III of this Journal; the names which appeared in "A Conspectus of Mexican, West Indian, Central and South American species and varieties of Salix" and in parts I–IV of the Notes published in Botanical Gazette are almost all repeated in the preceding Systematic Enumeration where reference to their place in Botanical Gazette will be found on the page indicated in this index; of a few names not mentioned again the reference to the Botanical Gazette is given preceded by "B. G."

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